

**A66 Northern Trans-Pennine Project
TR010062**

**3.2 Environmental Statement
Chapter 4 Environmental Assessment
Methodology**

APFP Regulations 5(2)(a)

Planning Act 2008

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**3.2 ENVIRONMENTAL STATEMENT
CHAPTER 4 EIA METHODOLOGY**

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None

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4.1 - EIA Scoping Report

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4 Environmental Assessment Methodology

4.1 Introduction

4.1.1 This chapter of the Environmental Statement (ES) details the overall approach taken to the Environmental Impact Assessment (EIA). It introduces the role of the Design Manual for Roads and Bridges (DMRB) and other applicable regulatory requirements and guidance in setting the context and requirements for the topic assessments. The specific scope, approach and method of assessment used for each environmental factor are identified in the relevant chapters of this ES.

4.2 General Approach to EIA

National Policy Statement for National Networks

- 4.2.1 The *National Policy Statement for National Networks (NPSNN)* (Department for Transport, 2014)¹ sets out the need for - and the Government's policies to deliver - Nationally Significant Infrastructure Projects (NSIP) on the national road and rail networks in England. NPSNN is used by the Secretary of State (SoS) as the primary basis for making decisions on Development Consent Order (DCO) applications for NSIP, in accordance with s104 of the Planning Act 2008 (PA 2008).
- 4.2.2 As the Project is a road network NSIP, National Highways has ensured that the EIA approach adopted is in accordance with *NPSNN*. In particular, the EIA adheres to all of the methodology requirements cited within *NPSNN* Section 5: Generic Impacts. Mitigation measures have been developed in accordance with the mitigation requirements also set out in Section 5 of *NPSNN*.
- 4.2.3 On 22 July 2021, the Secretary of State (SoS) for Transport announced that the Department was to commence a review of NPSNN, which is aimed to complete in spring 2023. Whilst that review is being undertaken, the NPSNN will remain fully in force. As such, this Environmental Statement (ES) makes reference to the tests set out in NPSNN as it currently stands.
- 4.2.4 *NPSNN* general policy requirements relevant to EIA are identified in Table 4-1. A full review of the NPSNN and the conformity of the application with each policy requirement is included within the wider application for development consent in Appendix A of The Case for the Project (Application Document 7.1).

Table 4-1: NPSNN policy requirements relevant to EIA

NPSNN paragraph number	Requirement	Where addressed
4.15 (Environmental Impact Assessment)	All proposals for projects that are subject to the European Union's Environmental Impact Assessment Directive and are likely to have significant effects on the environment, must be accompanied by an environmental	ES prepared in accordance with the EIA Regulations

¹ Department for Transport (2014) National Policy Statement for National Networks

NPSNN paragraph number	Requirement	Where addressed
	<p>statement (ES), describing the aspects of the environment likely to be significantly affected by the project. The Directive specifically requires an environmental impact assessment</p> <p>to identify, describe and assess effects on human beings, fauna and flora, soil, water, air, climate, the landscape, material assets and cultural heritage, and the interaction between them. Schedule 4 of the Infrastructure Planning (Environmental Impact Assessment)</p> <p>Regulations 2009² sets out the information that should be included in the environmental statement including a description of the likely significant effects of the proposed project on the environment, covering the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the project, and also the measures envisaged for avoiding or mitigating significant adverse effects. Further guidance can be found in the</p> <p>online planning portal. In this NPS, the terms 'effects', 'impacts' or 'benefits' should accordingly be understood to mean likely significant effects, impacts or benefits.</p>	
4.16	<p>When considering significant cumulative effects, any environmental statement should provide information on how the effects of the applicant's proposal would combine and interact with the effects of other development (including projects for which consent has been granted, as well as those already in existence).</p>	Chapter 15: Cumulative Effects
4.18	<p>In some instances it may not be possible at the time of the application for development consent for all aspects of the proposal to have been settled in precise detail. Where this is the case, the applicant should explain in its application which elements of the proposal have yet to be finalised, and the reasons why this is the case.</p>	Reasonable worst case development extents and activities have been identified for the purposes of assessment. These are set out within Chapter 2: The Project and, where applicable, in the topics chapters of this ES.
4.19	<p>Where some details are still to be finalised, applicants are advised to set out in the environmental statement, to the best of their</p>	Reasonable worst case development extents and activities have been identified

² Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 are now in force.

NPSNN paragraph number	Requirement	Where addressed
	<p>knowledge, what the maximum extent of the proposed development may be (for example in terms of site area) and assess the potential adverse effects which the project could have to ensure that the impacts of the project as it may be constructed have been properly assessed.</p>	<p>for the purposes of assessment. These are set out within Chapter 2: The Project and, where applicable, in the topics chapters of this ES.</p>
<p>4.26 (Alternatives)</p>	<p>Applicants should comply with all legal requirements and any policy requirements set out in this NPS on the assessment of alternatives. In particular:</p> <ul style="list-style-type: none"> • The EIA Directive requires projects with significant environmental effects to include an outline of the main alternatives studied by the applicant and an indication of the main reasons for the applicant's choice, taking into account the environmental effects. • There may also be other specific legal requirements for the consideration of alternatives, for example, under the Habitats and Water Framework Directives. • There may also be policy requirements in this NPS, for example the flood risk sequential test and the assessment of alternatives for developments in National Parks, the Broads and Areas of Outstanding Natural Beauty (AONB). 	<p>Chapter 3: Assessment of Alternatives. Chapter 6: Biodiversity and Habitat Regulations Assessment (HRA) Statement to Inform Appropriate Assessment (Application Document 3.6), ES Appendix 14.1: WFD Compliance Assessment and ES Appendix 14.2: Flood Risk Assessment (Application Document 3.4)</p>
<p>4.27</p>	<p>All projects should be subject to an options appraisal. The appraisal should consider viable modal alternatives and may also consider other options (in light of the paragraphs 3.23 to 3.27 of this NPS). Where projects have been subject to full options appraisal in achieving their status within Road or Rail Investment Strategies or other appropriate policies or investment plans, option testing need not be considered by the examining authority or the decision maker. For national road and rail schemes, proportionate option consideration of alternatives will have been undertaken as part of the investment decision making process. It is not necessary for the Examining Authority and the decision maker to reconsider this process, but they should be satisfied that this assessment has been undertaken.</p>	<p>Chapter 3: Assessment of Alternatives</p>

Design Manual for Roads and Bridges

- 4.2.5 Guidance published by the Government for the preparation of environmental assessments of proposed road projects is contained in the DMRB. This sets out both the general process and the methods for assessing individual environmental topics.
- 4.2.6 All EIA work and environmental reporting has been undertaken in accordance with:
- *DMRB LA 101 Introduction to Environmental Assessment (DMRB LA 101)* (Highways England, 2019a)³
 - *DMRB LA 102 Screening projects for Environmental Impact Assessment (DMRB LA 102)* (Highways England, 2019b)⁴
 - *DMRB LA 103 Scoping projects for environmental assessment (DMRB LA 103)* (Highways England, 2020a)⁵
 - *DMRB LA 104 Environmental assessment and monitoring (DMRB LA 104)* (Highways England, 2020b)⁶
- 4.2.7 The methodologies used for the assessments for individual topics in this ES are based on those set out in the EIA Scoping Report (informed by the DMRB and other relevant guidance), having regard to the Scoping Opinion, feedback on the Preliminary Environmental Information (PEI) Report, and discussions with relevant statutory bodies. These are described in the relevant topic chapters in this ES.

4.3 Other relevant assessments

- 4.3.1 The ES has been prepared taking into account other relevant environmental assessments required by legislation other than the EIA Regulations, with a view to avoid duplication of assessment.

Habitats Regulations Assessment

- 4.3.2 A HRA has been undertaken for each Special Area of Conservation (SAC) and Special Protection Area (SPA) that could be affected by the Project in accordance with the Conservation of Habitats and Species Regulations 2017 and the Birds Directive 2009/147/EC. There are no Ramsar Sites, proposed SAC (pSAC) or potential SPA (pSPA) affected by the Project. The HRA is included in the DCO application (Application Document 3.5 and Application Document 3.6).

Water Framework Directive Compliance Assessment

- 4.3.3 A Water Framework Directive (WFD) Compliance Assessment has been undertaken and reported in ES Appendix 14.1: WFD Compliance Assessment. This considers the extent to which the Project could impact

³ Highways England (2019a) Design Manual for Roads and Bridges LA 101 Introduction to Environmental Assessment

⁴ Highways England (2019b) Design Manual for Roads and Bridges LA 102 Screening projects for Environmental Impact Assessment

⁵ Highways England (2020a) Design Manual for Roads and Bridges LA 103 Scoping projects for environmental assessment

⁶ Highways England (2020b) Design Manual for Roads and Bridges LA 104 Environmental assessment and monitoring

on the current and future target WFD status of the water bodies. The results are presented in ES Chapter 14: Road Drainage the Water Environment.

Flood Risk Assessment

- 4.3.4 A FRA has been undertaken to consider the influence of the Project on local flooding and the mitigation measures embedded in the Project design. This is provided in ES Appendix 14.2: Flood Risk Assessment (Application Document 3.4).

4.4 Defining key parameters for the EIA

Order Limits and study area

- 4.4.1 The outer boundary of the land required temporarily and/or permanently for the construction, operation and maintenance of the Project is referred to as the Order Limits. The land plans submitted as part of the DCO application (Application Document 5.13) illustrate the land and/or rights required to deliver the Project.
- 4.4.2 The design of the Project has evolved in response to emerging information and to take account of statutory consultation feedback and ongoing engagement with stakeholders. Land and rights likely to be required for the Project have been discussed directly with landowners and relevant stakeholders, where appropriate. The design development and refinement of the Order Limits has not led to any changes that are likely to materially alter the scope of the EIA from that set out in the Scoping Opinion (see ES Appendix 4.2: EIA Scoping Opinion (Application Document 3.4)).
- 4.4.3 Study areas have been defined individually for each environmental factor in the relevant ES chapters, taking account of DMRB and other relevant topic-specific guidance where applicable, the geographic scope of the potential impacts relevant to that topic and the information required to assess those impacts. The study areas are described within each relevant chapter of the ES.
- 4.4.4 The study area for each environmental factor incorporates the full extent of the Order Limits as a minimum.

Identification of baseline and future conditions

- 4.4.5 In order to identify the effects of the Project on the environment, it is important to understand the environment that would be affected by the Project (the 'baseline conditions'). Understanding the baseline conditions allows measurements of changes that would be caused by the Project.
- 4.4.6 The baseline conditions are not necessarily the same as those that exist at the current time; they are the conditions that would exist in the absence of the Project either at:
- the time construction is expected to start, for impacts arising from construction; or
 - the time the Project is expected to open to traffic, for impacts arising from the operation.

- 4.4.7 Therefore, the identification of the baseline and future conditions involves predicting changes that are likely to happen in the intervening period, for reasons unrelated to the Project. This entails taking current conditions and committed development into consideration and using experience and professional judgement to predict what the baseline and future conditions might look like prior to start of construction and operation. This includes taking account of natural changes, as far as this can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.
- 4.4.8 It is essential for an EIA that sufficient data is obtained to form the basis of the assessment. Each chapter explains the data that has been gathered and used to inform the assessment and how it was gathered and includes a description of the current (baseline) environmental conditions and future baseline scenario based on the study area defined for that environmental factor.
- 4.4.9 The ES presents baseline information representing the conditions of the environment at the time of writing. When describing the future baseline scenario for each environmental factor within the respective topic chapters, readily available information such as local plans and climate change scenario data has been utilised to provide a description of the changes, both natural and human-influenced, in the local environment over an appropriate timescale that the datasets support. ES Chapter 15: Cumulative Effects identifies potential future development from local authority data sets – including planning policy documents and planning application registers – to identify potential future receptors in relevant chapters of this ES.

Limits of Deviation

- 4.4.10 Limits of Deviation (LoD) are the geographical limits within which the DCO will authorise the Project to be constructed, both horizontally and vertically. Changes to the design may occur through the detailed design process, typically as a result of issues that are identified through pre-construction surveys, for example ground conditions, or through ongoing construction planning. The LoD allows for a tolerance with respect to any distances and points shown on the plans that accompany the DCO application.
- 4.4.11 The DCO, if granted, will allow for the Project to be constructed anywhere within the maximum extent of the defined LoD. This includes a vertical deviation and a lateral deviation. As a result, there is some necessary flexibility as to the exact details of the Project taken through consenting to construction. A series of maximum and (where relevant) minimum LoD have been established and are defined in Chapter 2: The Project.
- 4.4.12 The LoD are contained in the DCO and have been considered and assessed within the topic specific chapters of the ES. Each chapter sets out how it has accounted for the LoD, where they are relevant to the assessment presented in that chapter.

Dealing with uncertainty

- 4.4.13 In assessing the effects of the Project from an environmental perspective, the principle of the 'Rochdale Envelope' has been applied, in accordance with the Planning Inspectorate (*PINS*) *Advice Note Nine: Rochdale Environment (AN9)* (Planning Inspectorate, 2018a)⁷. AN9 states:
- 4.4.14 1.2 *"The 'Rochdale Envelope' approach is employed where the nature of the Proposed Development means that some details of the whole project have not been confirmed (for instance the precise dimensions of structures) when the application is submitted, and flexibility is sought to address uncertainty. Such an approach has been used under other consenting regimes (the Town and Country Planning Act 1990 and the Electricity Act 1989) where an application has been made at a time when the details of a project have not been resolved."*
- 4.4.15 Where there is uncertainty about the final design and/or location of part of the Project due to the necessary flexibility within the DCO (for example, relating to LoD as described above), each topic within the ES defines the worst-case scenario that would reasonably apply to that topic. This allows the assessment set out in the ES to identify all likely significant effects that could arise, and to set out mitigation accordingly. Where this is the case, as far as possible mitigation is framed within the context of the objective that it needs to achieve rather than being tied to the specific action or set of actions, therefore if a change occurs within the envelope the mitigation can be adjusted to ensure it still delivers the required outcome.
- 4.4.16 Where there are particular receptors that require very specific design or management measures to protect them, these are defined in a way that limits the flexibility to provide certainty in the assessment and the defined mitigation.
- 4.4.17 Each chapter sets out how the LoD and any other aspects of flexibility have been taken into account in the assessment, plus what is defined as the worst case for each aspect of the assessment and why.

Defining assessment years and scenarios

- 4.4.18 The assessment of effects in this ES involves comparing a scenario without the Project and scenario with the Project. These are referred to as the Do-Minimum (DM) (without the Project) and Do-Something (DS) (with the Project) scenarios respectively.
- 4.4.19 The DM scenario represents the future baseline with minimal interventions and without new infrastructure.
- 4.4.20 The likely significant environmental effects for DS scenarios are assessed for the future baseline year and future year, or series of future years, depending on the environmental factor.

⁷ Planning Inspectorate (2018a) Using the Rochdale Envelope, Version 3, available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2013/05/Advice-note-9.-Rochdale-envelope-web.pdf> [accessed 10 February December 2022]

- 4.4.21 For assessing effects, the baseline year represents the conditions prior to construction starting. If the DCO is granted, construction is expected to start in 2024 and the Project is expected to be open to traffic in 2029. The future year scenario (a period of 15 years after opening) is 2044. This is a future point in time when mitigation measures are likely to have become fully established and will have achieved their desired outcome.
- 4.4.22 As explained in ES Appendix 4.1: EIA Scoping Report (Application Document 3.4), demolition of the Project has been scoped out of the EIA on the basis that the road would become an integral part of national infrastructure and would not be decommissioned.

Traffic Assessment

- 4.4.23 Detailed operational traffic modelling and assessment has been used in order to define the need for the Project, to test and refine the design, and to understand the effects of it. The Transport Assessment (Application Document 3.7) presents the outputs of the traffic modelling and assessment undertaken to date, considering both the changes to traffic on the A66 itself but also the changes to the local road network and the wider strategic network. The traffic modelling is reported in full in the Transport Assessment submitted as part of the DCO application.
- 4.4.24 The output of the traffic modelling is utilised as part of the EIA to inform the noise and air quality modelling in particular. Each chapter of this ES where this data has informed the assessment includes a description of the information used to inform the modelling.
- 4.4.25 There is no separate Traffic and Transport assessment required by DMRB and there is no such chapter presented in this ES. As a road project the change in traffic is an objective of the Project rather than an effect of it. Relevant information on traffic is presented in ES Chapter 2: The Project and the data utilised to understand the environmental effects of changes in traffic conditions, both on the road itself and the affected route network (which is part of the ES) is referred to, as applicable, in relevant ES chapters. The broader detail of changes to traffic and how that will impact on the operation of the road network is set out in the Transport Assessment (Application Document 3.7).

Baseline traffic data

- 4.4.26 In terms of the production of traffic forecasts, the Project has followed appraisal advice from Department for Transport's (DfT) 2020 guidance '*A route map for updating TAG (Transport Analysis Guidance) during uncertain times*' (Department for Transport, 2020)⁸, which includes growth revisions reflecting both anticipated Covid-19 impacts and impacts from growth forecasts issued by the Office for Budget Responsibility (OBR), which represent a significant reduction in growth compared to any previous OBR update.
- 4.4.27 The anticipated February 2021 TAG appraisal update remains delayed. As such the advice within the July 2020 document will continue to be

⁸ Department for Transport (2020) Appraisal and Modelling Strategy A route map for updating TAG during uncertain times

followed alongside an appraisal update issued in May 2021, which provided minor updates to the appraisal parameters. The May 2021 parameters have therefore been used within the modelling informing the DCO application.

- 4.4.28 The approach to traffic modelling and limitations associated with it, is set out in the Transport Assessment.

Proportionality

- 4.4.29 The Project comprises eight individual schemes that will be delivered in four packages. This complexity means that it has been necessary for each environmental factor assessment to identify effects and propose mitigation specific to each scheme as well as considering the potential for route wide effects.
- 4.4.30 Effects from multiple schemes on a single receptor are not considered to be cumulative effects. Where a receptor is predicted to experience an effect or effects resulting from more than one scheme, the overall predicted effects of the Project as a whole (i.e. considering effects arising from any of the schemes) on that receptor is reported only once (as the location in which the greatest effects would be caused), in the scheme within which the receptor is located (or if the receptor is located between schemes, within the scheme it is closest to). The exception to this is the landscape assessment (see Chapter 10: Landscape and Visual Effects), where the scale of the landscape receptors (Landscape Character Units) means that different locations within the receptor may experience different effects from different schemes. Where this is the case, the receptors are reported for each of the schemes where they are affected, but the assessment for that location considers the overall effects of the Project (all schemes).
- 4.4.31 Given the scale and complexity of the Project, it is important that the ES is proportionate and focusses on the likely significant effects of the Project. All non-significant effects are therefore reported in tabular form in an appendix to each topic chapter to demonstrate consideration of all likely effects, but the ES will report only on likely significant effects and the proposed mitigation as required. There may be some circumstances where a different approach is adopted, such as where no significant effects are predicted but this assessment needs to be presented within the ES chapter for clarity. Where applicable, this is explained in the relevant ES chapter.
- 4.4.32 Cumulative effects are assessed in ES Chapter 15: Cumulative Effects. Where a particular topic, for example biodiversity (ES Chapter 6: Biodiversity) or human health (ES Chapter 13: Population and Human Health) is receptor-based it considers all significant and non-significant effects that could, in-combination, result in a significant effect overall upon a receptor.

4.5 EIA scoping

- 4.5.1 An EIA Scoping Report was submitted with a request for a Scoping Opinion made by the Applicant to PINS under the EIA Regulations in June 2021 (the Scoping Report). This is included at ES Appendix 4.1:

EIA Scoping Report (Application Document 3.4) and can also be viewed online at the following link:

[https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/TR010062/TR010062-000025-TR010062%20-%20Scoping%20Report%20\(Part%201%20of%2011%20-%20Main%20Report%20&%20Appendices\).pdf](https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/TR010062/TR010062-000025-TR010062%20-%20Scoping%20Report%20(Part%201%20of%2011%20-%20Main%20Report%20&%20Appendices).pdf)

- 4.5.2 PINS consulted on the scoping request prior to adopting the Scoping Opinion in July 2021 (the Scoping Opinion). This is included at ES Appendix 4.2: Scoping Opinion (Application Document 3.4) and can also be viewed online at the following link:

<https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/TR010062/TR010062-000005-TR010062-Scoping-Opinion.pdf>

- 4.5.3 National Highways acknowledges the PINS comments presented in the Scoping Opinion and notes the detailed comments provided by the statutory consultees to PINS in Appendix 2 to the Scoping Opinion. Collectively these comments (EIA Scoping comments) have been considered in undertaking the EIA and in preparing this ES. The ES is based on the Scoping Opinion unless otherwise agreed and, if applicable, this is referred to in the chapters of this ES.

- 4.5.4 The individual technical chapters within this ES provide a tabulated summary of any key EIA Scoping comments relevant to that topic. Where assessment has been undertaken in accordance with the Scoping Opinion, a response and a reference to the relevant ES section is provided. Where the approach taken is not in accordance with the Scoping Opinion, this has been discussed with PINS and, in accordance with their advice, agreed with the relevant consultees. In these instances, an explanation is provided within the topic chapter scoping tables. Where applicable, EIA Scoping comments in relation to Chapter 1: Introduction to Chapter 4: Environmental Assessment Methodology are referred to in these chapters.

- 4.5.5 National Highways has maintained ongoing dialogue with PINS and other relevant statutory consultees in order to ensure that the scope of the EIA is proportionate and meets the requirements of the EIA Regulations. The scope of the EIA for each topic has been discussed and agreed with the relevant statutory consultees and this is stated within individual technical chapters as relevant.

Topics scoped in

- 4.5.6 The EIA considers the following environmental factors in accordance with Schedule 4 of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations):

- Air quality
- Biodiversity
- Climate
- Cultural heritage
- Geology and soils

- Landscape and visual
- Material assets and waste
- Noise and vibration
- Population and human health
- Road drainage and the water environment
- Cumulative effects.

Topics scoped out

Heat and radiation

- 4.5.7 The EIA Regulations also introduced the requirement for the emission of heat and radiation to be considered. The Project does not introduce any sources of heat and radiation. Therefore, the topic of the heat and radiation has been scoped out of the assessment.

Electric and Magnetic Fields

- 4.5.8 The project does not impact any receptors from potential sources of Electric and Magnetic Fields (EMF) due to it being a road construction project. There are no electrical installations such as substation and connecting underground cables or overhead lines from the Project. Therefore, the topic of EMF has been scoped out of the assessment.

Transboundary effects

- 4.5.9 Regulation 32 of the EIA Regulations requires the consideration of any likely significant effects on the environment of another European Economic Area (EEA) State. Guidance on transboundary effects is provided in *Planning Inspectorate Advice Note Twelve: development with significant transboundary impacts consultation (AN12)* (Planning Inspectorate, 2018b)⁹. PINS will determine if the Project is likely to result in significant transboundary effects.
- 4.5.10 As the Project involves upgrade works to a trunk road to make it dual carriageway throughout, any significant environmental effects are most likely to be experienced at local or regional level. It is considered unlikely that the Project would have a significant environmental effect, either on its own or cumulatively, in another EEA state.

Major accidents and disasters

- 4.5.11 The EIA Regulations require consideration of major accidents and disasters, referred to in *DMRB LA 104* as major events.
- 4.5.12 *DMRB LA 104* identifies the need to consider major events with reference to:
- Vulnerability of the Project to risks of major events
 - Any consequential changes in the predicted effects of that project on environmental factors
- 4.5.13 *DMRB LA 104* acknowledges that not all events warrant assessment and that evidence should be provided to support the view that they are classified as major events.

⁹ Planning Inspectorate (2018b) Advice Note Twelve: Transboundary impacts and process, Version 5

- 4.5.14 Where applicable, an assessment of major events is to be reported within the relevant environmental topic chapters of the ES. Major events is therefore not an environmental topic in its own right.
- 4.5.15 An assessment of the potential for major events risk as a result of the Project was presented in Appendix 5.1 of the Scoping Report (see ES Appendix 4.1: EIA Scoping Report (Application Document 3.4)). This concluded that the Project is unlikely to result in an unacceptable risk of significant environmental effects from major events not otherwise considered within other topic chapters or mitigated through project design and the requirements of existing legislation. Therefore, by virtue of the nature and location of the Project it was considered that the topic of major events should be scoped out of the assessment.
- 4.5.16 The Scoping Opinion (see ES Appendix 4.2: EIA Scoping Opinion (Application Document 3.4)) concluded that:
“...the ES does not need to include a standalone major accidents and/or disaster aspect chapter, provided consideration of such impacts are included in the relevant aspect chapters, where likely significant effects could occur.”
- 4.5.17 Notwithstanding, there were some additional potential major risks identified in the Scoping Opinion that should be considered using the same approach adopted in the Scoping Report. In particular:
*“Further consideration should be given to ground instability risks associated with Gypsum mines at Kirby Thore...
 Hulands Quarry...
 The Settle to Carlisle line crosses the DCO boundary...
 ...two pipelines that currently cross under the A66 to the south east of Penrith.”*
- 4.5.18 To address these additional potential risks, the referencing and shortlist appraisal table presented in Appendix 5.1 of the Scoping Report has been used below in Table 4-2: Major events – appraisal of additional risks identified through scoping.

Table 4-2: Major events – appraisal of additional risks identified through scoping

Major Event		Need to be considered further?	Where addressed?	Likely Significant Effects?
5.2	Rail accidents	The Settle to Carlisle line crosses above the Order Limits to the north-west of Appleby. The Project ties into the existing road in this location with any required alterations to road markings or verge seeding. No construction works are proposed adjacent to or beneath the railway, and the Order Limits do not encroach into the boundary of operational railway land. The	CDM Risk Register, Project Risk Register and as part of detailed design.	No

Major Event		Need to be considered further?	Where addressed?	Likely Significant Effects?
		<p>management of any works in the general vicinity of the operational railway would be via existing asset protection mechanisms adopted by a competent contractor adhering to CDM, construction planning and any protective provisions that may be required for inclusion in the DCO.</p> <p>Once operational, there is not considered to be any change to the likelihood or type of risk of or from rail accidents from co-existence of the A66 and the Settle to Carlisle railway line.</p>		
6.8	Utilities failures	<p>Pipelines under the A66 south-east of Penrith.</p> <p>The Order Limits fall within the consultation zone of pipelines east of Penrith that cross under the A66 between the A66/B6262 junction and Whinfell Park.</p> <p>The design of the proposed access to Whinfell Holme Wastewater Treatment Works was altered to move physical works away from the pipeline. The only remaining works within the consultation zone relate to the road widening itself and the provision of paths. The detailed design will continue to evolve in order to minimise the extent of any works interfacing with the consultation zone of this pipeline. The management of any works in the general vicinity of the pipeline would be via existing consultation and asset protection mechanisms adopted by a competent contractor adhering to CDM and construction planning and any protective provisions that may be required for inclusion in the DCO.</p> <p>Once operational, there is not considered to be any change to the likelihood or type of risk associated</p>	CDM Risk Register, Project Risk Register and as part of detailed design.	No

Major Event		Need to be considered further?	Where addressed?	Likely Significant Effects?
		with this pipeline. The access road to the Wastewater Treatment Works will be located further from the pipeline than existing.		
7.8	Mining industry	<p>Ground instability risks associated with Gypsum mines at Kirby Thore.</p> <p>Potential risks associated with dissolution in the gypsum and limestone bedrock can result in ground instability from dissolution features referred to as “karst” (e.g. caves, voids, stream sinks and risings, etc.). Without mitigation they could present significant geotechnical subsidence hazards.</p> <p>The design has been developed to avoid works over any known mining locations and significant areas of karst risk. Where this has not been possible, detailed mitigation measures are identified in ES Chapter 14: Road Drainage and the Water Environment (Application Document 3.2) and ES Appendix 14.8 Karst Risk Assessment (Application Document 3.4), including measures to avoid and minimise risks, and monitoring proposals once the road is operational.</p> <p>It is therefore considered that karst risks have been adequately assessed and mitigation proposed.</p>	<p>CDM Risk Register, Project Risk Register and as part of detailed design.</p> <p>ES Chapter 14: Road Drainage and the Water Environment (Application Document 3.2) and ES Appendix 14.8 Karst Risk Assessment (Application Document 3.4).</p>	No

Major Event		Need to be considered further?	Where addressed?	Likely Significant Effects?
7.8	Mining industry	<p>Ground instability risks associated with Hulands Quarry.</p> <p>The Order Limits fall within the consultation zone for Hulands Quarry.</p> <p>There is only minor encroachment into the site to enable the existing access to be upgraded and the central reserve gap closed. No other proposed works would affect the quarry.</p> <p>Once operational, there is not considered to be any change to the likelihood or type of risk of or from ground instability resulting from co-existence of the A66 and Hulands Quarry.</p>	CDM Risk Register, Project Risk Register.	No

4.5.19 Based on the information presented in Table 4-2: Major events – appraisal of additional risks identified through scoping there are not considered to be any significant effects associated with major events not adequately covered by the design, assessment and mitigation presented in this ES.

Topics partially scoped out

4.5.20 Through the scoping process, a number of topics that are scoped in overall for further assessment did identify particular resources/features that would be scoped out and this has been agreed by PINS through its Scoping Opinion. These include:

- Biodiversity: identified specific types of designated sites, protected species or habitats scoped out depending upon the scheme that is subject to the assessment.
- Climate: scoped out vulnerability to climate change for the construction phase based on the likely extent and magnitude of climate change within the timescales expected for construction.
- Cultural heritage: all physical effects on heritage resources during operation, as impacts would have occurred during construction.
- Geology and soil: scoped out new and historic contamination, specific geological features and soil resource depending on the scheme and risk of encountering unexploded ordnance (UXO) across the route.
- Landscape and visual: scoped out effects on conservation areas and landscape and visual effects in some locations.
- Material assets and waste: scoped out operational resource use and waste beyond the first year of operation.

- Population and human health: scoped out certain elements of the population and human health impacts, dependent upon the scheme.
- Road drainage and the water environment: scoped out flood risk and impacts at M6 Junction 40 and A1(M) Junction 53 Scotch Corner.

4.5.21 Where applicable, the chapters of this ES present more detail on the scoping process as it relates to that environmental factor, and the final scope of each technical assessment presented.

4.6 Significance criteria

Environmental assessment methodology

4.6.1 The EIA process has taken into account of the relevant DMRB standards noted in section 4.2: General Approach to EIA. Other topic specific legislation and good practice guidance has been considered and details of these can be found in the topic chapters within this ES.

4.6.2 The assessment of each environmental factor forms a separate chapter of this ES. For each chapter, the following has been addressed in line with the requirements of DMRB and the EIA Regulations:

- Introduction
- Key assessment parameters
- Legislative and policy framework
- Assessment methodology
- Assumptions and limitations
- Study area
- Baseline conditions
- Potential impacts
- Essential design, mitigation and enhancement measures
- Assessment of likely significant effects
- Monitoring.

4.6.3 Each topic chapter provides details of the methodology for baseline data collection and evaluation of effects based on EIA good practice guidance documents and relevant topic specific guidance where available.

Assessment of effects

4.6.4 The EIA process requires the identification of the likely significant environmental effects of the Project. This includes consideration of the likely effects during the construction and operational phases.

4.6.5 *DMRB LA 104* provides a standard approach to the determination of significance of environmental effects for highway schemes. This includes consideration of the following:

- Assigning value (or sensitivity) of receptors.
- Assigning magnitude of impact.
- Assigning significance of impact.

Assigning value of receptors

- 4.6.6 Receptors are defined as individual environmental features that have the potential to be affected by the Project. For each environmental factor, baseline studies have informed the identification of potential environmental receptors. Some receptors are more sensitive to certain environmental effects than others. The value (or sensitivity) of a receptor may depend, for example, on its frequency, extent of occurrence or conservation status at an international, national, regional or local level.
- 4.6.7 Value (or sensitivity) is defined within each topic chapter and takes account of factors including:
- Vulnerability of the receptor to change
 - Recoverability of the receptor (ability of recover from a temporary impact)
 - Importance of the receptor.
- 4.6.8 As a general guide, the definitions set out in Table 3.2N of *DMRB LA 104* have been taken into account (except where topic standard/guidance requires otherwise). This includes a five-point scale for assigning environmental value (or sensitivity) as shown in Table 4-3: Environmental value (sensitivity) and description.

Table 4-3: Environmental value (sensitivity) and description

Value (sensitivity) of receptor/resource	Typical description
Very High	Very high importance and rarity, international scale and very limited potential for substitution
High	High importance and rarity, national scale, and limited potential for substitution
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution
Low	Low or medium importance and rarity, local scale
Negligible	Very low importance and rarity, local scale
*based on Table 3.2N of <i>DMRB LA 104</i>	

Magnitude of impact

- 4.6.9 In line with *DMRB LA 104* the magnitude of impacts on receptors are reported within the environmental assessments. The descriptions for magnitude of impact (outlined in Table 4-4: Magnitude of impact and typical descriptions are applied. Where relevant, individual topic chapters set out variations in magnitude description requirements.
- 4.6.10 For each topic, the likely environmental impacts have been identified within the ES. The likely environmental impact arising from the Project has been identified and compared with the baseline (the situation without the Project). Impacts are divided into those occurring during the construction and operational phases.

Table 4-4: Magnitude of impact and typical descriptions

Magnitude of impact		Typical criteria descriptions
Major	Adverse	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements
	Beneficial	Large scale or major improvement of resource quality; extensive restoration; major improvement of attribute quality
Moderate	Adverse	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements
	Beneficial	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality
Minor	Adverse	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements
	Beneficial	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Negligible	Adverse	Very minor loss or detrimental alteration to one or more characteristics, features or elements.
	Beneficial	Very minor benefit to or positive addition of one or more characteristics, features or elements
No change		No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Assigning significance

- 4.6.11 The significance of effects must be assessed and the likely significant effects of the Project on the environment must be reported on in accordance with the EIA Regulations.
- 4.6.12 *DMRB LA 104 recognises "The approach to assigning significance of effect relies on reasoned argument, the professional judgement of competent experts and using effective consultation to ensure the advice and views of relevant stakeholders are taken into account."*
- 4.6.13 Each ES topic chapter defines the approach taken to the assessment of significance. Where appropriate, topic chapters have adopted the general approach set out in Table 3.7 within *DMRB LA 104* (see Table 4-5: Significance categories and typical descriptions). Where relevant, individual environmental factors have set out variation in significance description requirements.

Table 4-5: Significance categories and typical descriptions

Significance category	Typical description
Very large	Effects at this level are material in the decision-making process.
Large	Effects at this level are likely to be material in the decision-making process.
Moderate	Effects at this level can be considered to be material decision-making

Significance category	Typical description
	factors.
Slight	Effects at this level are not material in the decision-making process.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error

Based on Table 3.7 of DMRB LA 104

4.6.14 The evaluation of significance takes into account industry and professional standards and guidance, codes of practice, policy objectives, regulations or standards, advice from statutory consultees and other stakeholders, as well as expert judgement of the EIA practitioners, based on specialist experience. For some topics, a simplified or quantitative approach is considered appropriate as set out in Table 3.8.1 within *DMRB LA 104* (see Table 4-6: Significance matrix).

Table 4-6: Significance matrix

		Magnitude of impact (degree of change)				
		No change	Negligible	Minor	Moderate	Major
Environmental value (sensitivity)	Very high	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Neutral	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

Based on Table 3.8.1 of *DMRB LA 104*

4.6.15 Where Table 4-6: Significance matrix includes two significance categories, evidence is provided to support the reporting of a single significance category.

4.6.16 Slight, moderate, large or very large effects may be beneficial or adverse. Except where guidance requires otherwise the significance of effects is described using the terms very large, large, moderate, slight and neutral. In terms of the EIA Regulations, 'significant' effects are those where effect is 'moderate' or greater.

4.6.17 Effects determined to be slight or neutral are deemed 'non-significant' and as such are not reported in detail in the main ES (ES Volume 1) and do not require specific mitigation. The exception to this is where the combination of multiple slight effects has the potential to lead to a significant (i.e. moderate or above) cumulative effects. This is picked up in principally receptor-based assessments such as biodiversity (ES Chapter 6: Biodiversity) or human health (ES Chapter 13: Population and Human Health), where all significant and non-significant effects that could, in-combination, result in a significant effect overall upon a

receptor. As part of National Highways' own commitment to reduce all impacts, there may be instances where mitigation is proposed in response to non-significant effects.

- 4.6.18 The main ES (ES Volume 1) reports on all significant effects. Non-significant effects are identified, where applicable, in Technical Appendices (ES Volume 3).
- 4.6.19 Not all environmental factors use the above approach. For example, some topics do not use a matrix-based approach but instead use numerical values to identify impacts (e.g. noise and vibration). The approach for each environmental factor is defined in DMRB. Further topic-specific details of the methodology for determining significance are presented in the topic chapters of this ES.
- 4.6.20 The assessment of the significance of environmental effects covers the following factors:
- The receptors/resources (natural and human) which would be affected and the pathways for such effects.
 - The geographic importance, sensitivity or value of receptors/resources.
 - The duration (long or short term); permanence (permanent or temporary) and changes in significance (increase or decrease).
 - Reversibility - e.g. is the change reversible or irreversible, permanent or temporary.
 - Environmental and health standards (e.g. local air quality standards) being threatened.
 - Feasibility and mechanisms for delivering mitigating measures, e.g. Is there evidence of the ability to legally deliver the environmental assumptions which are the basis of the assessment?

Combined and cumulative effects

- 4.6.21 Combined and cumulative effects result from multiple actions on receptors over time and are generally additive or interactive in nature. They can also be considered as effects resulting from incremental changes caused by other past, present or reasonably foreseeable actions together with the Project, identified as:
- Combined effects from a single project - the interrelationship between different environmental factors where numerous different effects impact a single receptor.
 - Cumulative effects from different projects - together with the Project being assessed.
- 4.6.22 The methodology for cumulative effects with other proposed developments is presented in ES Chapter 15: Cumulative Effects.

4.7 Design, mitigation, and enhancement measures

- 4.7.1 One of the key requirements of the EIA is that measures are taken to avoid, reduce and, where possible, remedy significant adverse environmental effects. These are termed mitigation measures and their development is part of an iterative EIA process. The EIA will identify

mitigation measures using a hierarchical system in line with the requirements of *DMRB LA 104*:

"Avoidance and prevention: design and mitigation measures to prevent the effect (e.g. alternative design options or avoidance of environmentally sensitive sites);

reduction: where avoidance is not possible, then mitigation is used to lessen the magnitude or significance of effects;

remediation: where it is not possible to avoid or reduce a significant adverse effect, these are measures to offset the effect."

4.7.2 Also in line with *DMRB LA 104*, the ES reports on the following categories of mitigation:

"Embedded mitigation: project design principles adopted to avoid or prevent adverse environmental effects. This will be reported in the project description and not repeated in each topic chapter of the ES."

"Essential mitigation: measures required to reduce and if possible offset likely significant adverse environmental effects, in support of the reported significance of effects in the environmental assessment. This will be reported in relevant topic chapter of the ES."

4.7.3 The project has also considered opportunities to deliver environmental enhancements. Where these are part of the Project they have been included in the DCO application and considered as part of the EIA.

4.7.4 Mitigation measures have been developed in response to the findings of surveys, assessments and consultation. These mitigation measures are designed principally to address impacts, the occurrence, timing and location of which can be predicted in advance and are intrinsic to the design of the Project.

Embedded mitigation

4.7.5 *DMRB LA 104* defines embedded mitigation as *"project design principles adopted to avoid or prevent adverse environmental effects."*

4.7.6 The first preference in mitigating any impact is to seek engineering and design measures to entirely avoid or eliminate the impact. Where this is not possible, the design should seek to reduce the magnitude of the impact. Impacts can be avoided or reduced, for instance, through changes to the horizontal or vertical alignment of the Project, junction strategy or other aspects of the Project layout; or through changes in the methods and/or materials to be used in construction.

4.7.7 The project design evolved through an iterative process between the engineering and environmental design and assessment teams, and through active engagement with statutory consultees, key stakeholders and the wider public. Throughout the iterative design process, design changes were integrated into the Project with the primary purpose of avoiding or reducing adverse effects at source and making the Project fit better into its landscape setting. These measures are integral to the Project and are termed 'embedded mitigation'.

- 4.7.8 Embedded mitigation is reported as part of ES Chapter 2: The Project (including highlighting where key changes to the design have been made specifically to avoid or reduce an environmental effect). Chapter 3: Assessment of Alternatives describes how environmental impacts have informed decision-making where design alternatives have been considered, as well as the reasons for selecting the proposed design solution over other alternatives considered. Where a specific design aspect has been incorporated in order to avoid a significant environmental effect, this is noted in the ES but also stated in the mitigation schedule in order to record the reason for the design decision taken at this stage, and ensure it is carried through to detailed design.
- 4.7.9 It is also assumed, as embedded mitigation, that all standard construction best practice measures to mitigate the environmental effects of construction will be implemented in line with the Environmental Management Plan (EMP) (Application Document 2.7). These are identified in the Register of Environmental Actions and Commitments (REAC) contained within the EMP. The EMP will become a certified document for the purposes of the DCO, and compliance with it will be the subject of a DCO requirement. This means compliance with its terms will be a legal requirement. The document will continue to evolve into the EMP and the Principal Contractor (PC) will develop this to set out exactly how each of the actions and commitments will be delivered.
- 4.7.10 Embedded mitigation in the form of design principles adopted, is secured via the Project Design Principles (Application Document 5.11). This sets out the key commitments, principles and outcomes that the developing design for certain aspects must take into account. This includes general principles that will inform the detailed design as well as certain specific commitments that set out specific design measures that need to be achieved including, if necessary at, specific locations.

Essential mitigation

- 4.7.11 Where avoidance of an impact through embedded mitigation is not possible, or is only partly effective, further mitigation measures are required, referred to as 'essential mitigation'. Essential mitigation falls into three broad categories:
- Measures that do not remove an impact but make it less significant. A typical example on the Project may include planting trees to screen views of the road where it is visually intrusive
 - The like-for-like replacement of a feature that would be lost. For example, this may include the creation of hedgerows on the Project alignment to replace those that cannot be avoided
 - The provision of a beneficial effect that is related to the impact but is not a like-for-like replacement of the feature to be lost. A typical example would be the construction of a bridge to replace an existing culvert, allowing associated watercourse re-naturalisation and improving the wildlife corridor function.
- 4.7.12 Mitigation measures can produce adverse as well as beneficial effects e.g. an environmental noise barrier can increase visual intrusion.

- 4.7.13 Mitigation identified during the EIA process that is required to further prevent, reduce and, where possible, offset any adverse effects on the environment are described in the relevant topic chapters. A design to show how the required environmental outcomes and objectives of that mitigation could be met is shown on the Environmental Mitigation Plans (Application Document 2.8), however the exact detail of mitigation locations and designs will be determined through the detailed design process and a final environmental mitigation design will be developed as part of the pre-commencement process and secured through the EMP. It is important to note that the precise content of the Environmental Mitigation Plans is not intended to be 'secured' by way of the DCO – instead, these maps present indicative layouts to show how the relevant mitigation measures could be implemented so as to be effective in terms of mitigating effects. However, as detailed design progresses, it may be the case that the layout indicated on the maps in the map book needs to be altered – importantly, this could only be done insofar as the layout complies with the requirements of the EMP.
- 4.7.14 The essential mitigation measures identified in the topic chapters of the ES are included in the construction best practice measures summarised in the Register of Environmental Actions and Commitments (REAC), contained within the EMP as part of the DCO application. Where the Project design and the parameters included in the DCO allow for some flexibility in design or how aspects of the Project are constructed, the Project Design Principles and/or EMP specifies the mitigation objective to be achieved and any specific constraints on the design, construction or operation that need to be implemented, but include adaptive mitigation to ensure that the mitigation as implemented achieves its desired outcome.
- 4.7.15 The likely significant effects of the Project are identified taking into account the embedded mitigation. The significance of an effect is then reported after an assessment of the effectiveness of any essential mitigation that has been identified specifically to address an effect (the residual effect). This approach allows for all deliverable and committed mitigation to be taken into account in determining the significance of effects reported in this ES.

Construction mitigation

- 4.7.16 There are potential impacts to the environment that could occur as a result of the construction process, including incidents during construction. The timing and location of these impacts cannot be accurately predicted at this stage. An example would include spillages of fuels, oils or other chemicals.
- 4.7.17 The assessment considers reasonably foreseeable construction impacts, taking into account the use of best practice construction management as embedded mitigation. The likelihood of occurrence and the severity of any such incidents can be reduced through good construction site management practices. To help ensure adequate consideration of risks identified during the EIA that would relate to the construction period, the EMP incorporates construction phase

management, setting out how construction stage mitigation measures would be implemented to manage risks and certain requirements for the contractors.

- 4.7.18 The EMP sets out the roles and responsibilities, control measures, training and briefing procedures, risk assessments and monitoring systems to be employed during planning and construction for all relevant environmental factor areas.
- 4.7.19 Each topic chapter describes the measures that must be adopted during construction to avoid and reduce environmental effects, such as pollution control measures, secured in the EMP.

Implementation and enforcement of mitigation

- 4.7.20 Mitigation will be secured through a series of certified documents under the DCO that must be complied with as a result of DCO requirements, making the content of them a legal requirement. As such, the Project must comply with all of the mitigation identified - to not do so would be a criminal offence.
- 4.7.21 The EMP will be developed in more detail and implemented at construction stage. The EMP will be a certified document under the DCO.
- 4.7.22 Contractors at detailed design and construction stage will be obliged to comply with the DCO and all documents secured by it.

Environmental enhancement

- 4.7.23 Enhancement is a measure that is over and above what is required to mitigate the adverse effects of a project. Enhancement opportunities have been identified throughout the Project. They are reported, where applicable, in the topic chapters of this ES.
- 4.7.24 Where essential mitigation is being delivered for other purposes, this offers an enhancement opportunity where it does not compromise the original mitigation objective for that land.

4.8 Monitoring

- 4.8.1 Where the environmental assessment reported in this ES concludes that there are likely significant adverse environmental effects, proportionate monitoring of associated mitigation measures may be required in accordance with the EIA Regulations to ensure they are successful in achieving their mitigation objectives.
- 4.8.2 Monitoring measures would be undertaken as required during construction, handover and through the operation and maintenance periods. These measures will be secured in the DCO application through the EMP. The results of monitoring shall be reported through updates of the EMP during the construction and handover phases. The EMP shall be used as a method of reporting specific monitoring and management measures post-consent.

4.9 References

Department for Transport (2014) National Policy Statement for National Networks

Highways England (2019a) Design Manual for Roads and Bridges LA 101
Introduction to Environmental Assessment

Highways England (2019b) Design Manual for Roads and Bridges LA 102
Screening projects for Environmental Impact Assessment

Highways England (2020a) Design Manual for Roads and Bridges LA 103 Scoping
projects for environmental assessment

Highways England (2020b) Design Manual for Roads and Bridges LA 104
Environmental assessment and monitoring

Planning Inspectorate (2018a) Using the Rochdale Envelope, Version 3

Department for Transport (2020) Appraisal and Modelling Strategy A route map for
updating TAG during uncertain times

Planning Inspectorate (2018b) Advice Note Twelve: Transboundary impacts and
process, Version 5