

A1 Birtley to Coal House

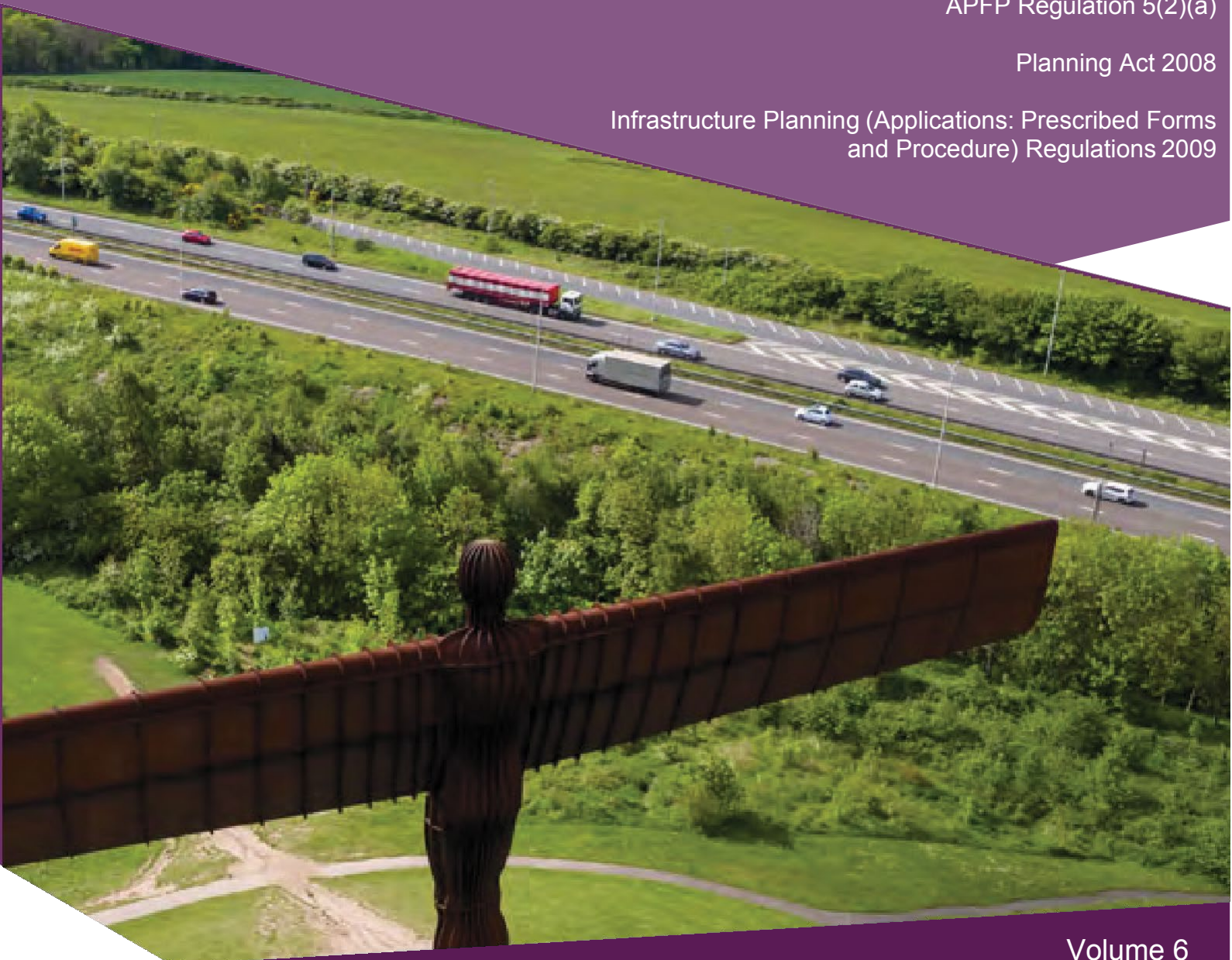
Scheme Number: TR010031

6.1 Environmental Statement Chapter 4 Environmental Assessment Methodology

APFP Regulation 5(2)(a)

Planning Act 2008

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



Infrastructure Planning

Planning Act 2008

**The Infrastructure Planning
(Applications: Prescribed Forms and
Procedures) Regulations 2009**

**A1 Birtley to Coal House
Development Consent Order 20[xx]**

Environmental Statement

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Planning Inspectorate Scheme Reference	TR010031
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4 ENVIRONMENTAL ASSESSMENT METHODOLOGY

4.1 OVERVIEW

- 4.1.1. The Design Manual for Roads and Bridges (DMRB) (**Ref 4.1**), including any Interim Advice Notes (IANs) (**Ref 4.2**), has been used as the main source of guidance, with relevant discipline specific guidance used as appropriate, for this Environmental Impact Assessment (EIA). In particular, the guidance contained in DMRB Volume 11 Environmental Assessment has been used. DMRB Volume 10 which contains guidance on Environmental Design and Management has also been used to inform topic areas as appropriate.
- 4.1.2. This chapter describes how the relevant guidance has been applied in the EIA that has led to the production of this Environmental Statement (ES).

4.2 ENVIRONMENTAL SCOPING

- 4.2.1. An EIA Screening exercise has been completed for the Scheme under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (**Ref 4.3**).
- 4.2.2. On the basis of the relevant thresholds, the Scheme falls within Annex II 10(b)(e) of the EIA Directive which covers the “construction of roads, harbours, and port installations, including fishing harbours (projects not included in Annex I)” of the EIA Directive.
- 4.2.3. The EIA Screening determination carried out by the Applicant concluded that that the Scheme is likely to result in significant environmental effects and that an EIA is required.
- 4.2.4. Following the EIA Screening exercise, a scoping exercise was carried out in accordance with Section 10 of the EIA Regulations. The purpose of scoping is to set out the proposed scope of the EIA and to support the request for feedback on any additional information to be provided in the ES in support of the Scheme’s application for a Development Consent Order (DCO).
- 4.2.5. The Scoping Report was submitted to the Inspectorate on 8 November 2017 with a request for a statutory Scoping Opinion. The Scoping Opinion was received on 18 December 2017 and has been considered when preparing this ES. The Scoping Opinion and Scoping Opinion Response Table in **Appendix 4.1** of this ES (**Application Document Reference: TR010031/APP/6.3**) have also been used to inform the topics that the EIA has assessed.
- 4.2.6. During the preparation of the Scoping Report, consultation with relevant stakeholders (including the statutory bodies) took place, in order to identify key environmental issues that needed to be assessed in detail and to inform baseline information and survey requirements. Stakeholders who were consulted during Scoping, included, but were not limited to, the following:

- a.** Lead Local Flood Authority (LLFA), Gateshead Council, in relation to **Chapter 13 Road Drainage and Water Environment** of this ES (**Application Document Reference: TR010031/APP/6.1**).
- b.** Environment Agency (EA) in relation to **Chapter 13 Road Drainage and Water Environment** of this ES (**Application Document Reference: TR010031/APP/6.1**).
- c.** Defra with regards to the availability of regional waste data for **Chapter 10 Material Resources** of this ES (**Application Document Reference: TR010031/APP/6.1**).
- d.** Historic England in relation to potential enhancement measures for **Chapter 6 Cultural Heritage** of this ES (**Application Document Reference: TR010031/APP/6.1**).
- e.** Natural England in relation to the scope of ecological surveys and the three Site of Special Scientific Interest (SSSIs) which lie within 3km of the proposals.

4.2.7. This ES has been prepared in accordance with the scope set out in the Scoping Report and the Scoping Opinion (**Appendix 4.1** of this ES (**Application Document Reference: TR010031/APP/6.3**)) received from the Inspectorate.

POST SCREENING/SCOPING CONSULTATION

Statutory Consultation

- 4.2.8. The DCO process requires statutory consultation to be undertaken prior to the submission of an application for a DCO. Under the 2008 Planning Act (**Ref 4.4**), there are three elements to statutory consultation as follows:
- a.** Section 42 sets out that consultation should be undertaken with prescribed consultees, local authorities, landowners and others with interests in land.
 - b.** Section 47 sets out that consultation with the local community in accordance with the Statement of Community Consultation (SoCC) should be undertaken.
 - c.** The Section 48 notice, which is a requirement to publish statutory notices of the proposed application for a DCO in local and national newspapers and the London Gazette.
- 4.2.9. Further details of the statutory consultation are provided in the Consultation Report (**Application Document Reference: TR010031/APP/5.1**).

Non-Statutory Consultation

- 4.2.10. Where relevant, non-statutory consultation and ongoing engagement has been conducted after the Scoping Opinion was issued by the Inspectorate, this has included, but is not limited to, consultation with:
- a.** Gateshead Council
 - b.** Newcastle City Council
 - c.** Sunderland City Council
 - d.** Historic England
 - e.** Tyne and Wear Archaeology Officer

- f. Natural England
- g. The Environment Agency
- h. The Coal Authority
- i. The North East Combined Authority
- j. Durham City Council

4.2.11. Further details are included in the technical **Chapters 5-14** of this ES and relevant details of the outcomes of consultation are included in **Appendix 4.4** Environmental Consultation of this ES (**Application Document Reference: TR010031/APP/6.3**).

4.2.12. There will be opportunities to comment on this ES and to participate in examination as part of the application for a DCO and its determination.

4.3 TOPICS CONSIDERED IN THE ENVIRONMENTAL STATEMENT

4.3.1. The environmental topics have been assessed within the EIA and reported in the ES comprise the following in accordance with DMRB Volume 11, IAN 125/09 and the Scoping Report:

- a. Air Quality
- b. Cultural Heritage
- c. Landscape and Visual
- d. Biodiversity
- e. Geology and Soils
- f. Material Resources
- g. Noise and Vibration
- h. Population and Human Health
- i. Road Drainage and the Water Environment
- j. Climate

HEALTH

4.3.2. Schedule 4 Part 5 of the EIA Regulations (**Ref 4.3**) requires a description of the likely significant effects on the environment resulting from, the risks to human health.

4.3.3. There is no consolidated methodology or practice for the assessment of health in EIA. However, the scope of the assessment is covered by existing Highways England guidance. This recognises the specific requirements of the (National Policy Statement for National Networks (NPSNN) (**Ref 4.5**) for consideration of health, specifically within paragraphs 4.79-4.82 (of the NPSNN). This ES considers impacts on human health using a cross topic approach and by utilising the guidance associated with the following topic assessments:

- a. Air Quality (HA 207/07, IAN 185/15, IAN 175/13, IAN 174/13, IAN 170/12) as reported in **Chapter 5 Air Quality** of this ES (**Application Document Reference TR010031/APP/6.1**).

- b.** Noise and Vibration (HD 213/11, IAN 185/15) as reported in **Chapter 11 Noise and Vibration** of this ES (**Application Document Reference TR010031/APP/6.1**).
- c.** People and Communities (DMRB Volume 11 Section 3 Part 8) as set out in **Chapter 12 Population and Human Health** of this ES (**Application Document Reference TR010031/APP/6.1**).
- d.** Road Drainage & The Water Environment (HD 45/09) as reported in **Chapter 13 Road Drainage and Water Environment** of this ES (**Application Document Reference TR010031/APP/6.1**).

4.3.4. In addition to guidance detailed above, good practice, professional judgement and experience, and established research has informed the methodology for health.

- a.** The assessment has addressed health in the first instance by using individual guidance for the above environmental topic areas to enable overall health conclusions to be determined. Qualitative potential health effects associated with specific issues are reported within **Chapter 12 Population and Human Health** of this ES (**Application Document Reference TR010031/APP/6.1**).

4.3.5. Where human health effects are identified in these topic assessments, whether significant or not, these effects have been incorporated into the cumulative effect's assessment of human health.

MAJOR ACCIDENTS AND DISASTERS

4.3.6. Schedule 4 Part 5 of the EIA Regulations requires an assessment of the potential vulnerability of the Scheme to major accident(s) and/or disaster(s).

4.3.7. An assessment of major accidents and disasters has been carried out for the Scheme and is provided in **Appendix 4.3** of this ES (**Application Document Reference TR010031/APP/6.3**). Thirteen major events during construction and six major events during operation, to which the Scheme may be vulnerable, were identified and these are detailed in **Table 4-1** and **Table 4-2** below. Based on the assumptions and mitigation measures as detailed in the Major Accidents and Disasters Report, it is considered that each of these events will be managed to be as low as reasonably practicable (ALARP).

Table 4-1 - Potential major risk events – construction phase

Risk record entry number	MAD Scoping group and category	Risk event (high level)	Hazard description	Hazard sources and/or pathways	Risk description	Reasonable worst consequence if event did occur	ES topic	Is this ALARP with existing mitigation?
3	Natural Hazards: Geophysical	Collapse damage to structures	Presence of unrecorded mine workings	Mine workings	Collapse of a mine workings leading to collapse of the roadway into a void.	Death and/or injury to members of the public.	– Population and Human Health	Yes
5	Natural Hazards: Geophysical	Ground collapse	Presence of unidentified wells, shafts and boreholes – ungrouted/sealed or only partially sealed - creating uncertainty of surface profile effects and pathway for pressurised grout expulsion.	Mine workings	The Coal Authority Report (Ref 4.6) details the treatment of six mine entries. No details are available with regards to the abandonment and stabilisation of the remaining mine entries. GI works completed by Central Alliance along the route in 2017/2018 have identified shallow coal workings within 30 metres from the surface which may present a stability issue to future development. If left untreated could pose a below ground collapse risk if built upon.	Death and/or injury to multiple road users.	– Population and Human Health	Yes
7	Natural Hazards: Geophysical	Ground collapse	Presence of recorded mine workings of unknown specification	Mine workings	Collapse of mine workings	Death and/or injury to members of the public.	– Population and Human Health	Yes
9	Natural Hazards: Geophysical	Major road traffic accident	Ground subsidence leading to damage of roadway and/or associated infrastructure.	Collapse of overhead structure onto carriageway Collapse of carriageway	The Coal Authority report (Ref 4.6) states that the Scheme Footprint is within the likely zone of influence from workings in thirteen seams of coal from shallow (<30m) to 240m bgl, with the Coal Authority database recording past and probable shallow mining below the majority of the Study Area east of junction 67 (Coal House). GI works completed by Central Alliance along the route in 2017/2018 have identified shallow coal workings within 30m from the surface which may present a stability issue to future development.	Death and/or injury to multiple road users.	– Population and Human Health	Yes

Risk record entry number	MAD Scoping group and category	Risk event (high level)	Hazard description	Hazard sources and/or pathways	Risk description	Reasonable worst consequence if event did occur	ES topic	Is this ALARP with existing mitigation?
					Increased maintenance requirements as a result of settlement.			
15	Technological or Manmade Hazards: Engineering accidents and failures	Major road traffic accident	Existing road bridges loaded with additional construction traffic e.g. piling rigs.	Collapsing bridge striking traffic/member of persons nearby	Unknown safe capacity of road bridges - Overloading leading to structural instability - injuries to road users and construction personnel.	Death and/or injury to members of the public.	- Population and Human Health	Yes
17	Technological or Manmade Hazards: Industrial and Urban Accidents	Fire and/or explosion or release of harmful gas	Presence of underground low, intermediate and high pressure gas pipelines	Presence of existing natural gas transmission pipelines	The intermediate pressure (IP) gas main would be diverted through the installation of a new main via means of by micro tunnelling technique using a slurry drive. The low-pressure (LP) gas main which currently goes underneath the northbound access and southbound exit slip roads would be diverted into Coal House roundabout using a combination of open cut trenches and trenchless techniques. The new LP gas main would be routed between the new foundations for the bridge. Work involving the abandonment and routing of the high pressure (HP), IP, medium pressure (MP) and LP mains affected by the Scheme would be carried out. Striking of underground services/utilities	Fire and/or explosion affects neighbouring property and/or members of the public.	- Population and Human Health	Yes
18	Technological or Manmade Hazards: Industrial and Urban Accidents	Fire and/or explosion or release of harmful gas	Presence of underground gas pipework	Release of flammable gas from pipeline	Ground subsidence leading to loss of containment.	Fire and/or explosion affects neighbouring properties and/or those people in the immediate area.	- Population and Human Health	Yes

Risk record entry number	MAD Scoping group and category	Risk event (high level)	Hazard description	Hazard sources and/or pathways	Risk description	Reasonable worst consequence if event did occur	ES topic	Is this ALARP with existing mitigation?
21	Technological or Manmade Hazards: Industrial and Urban Accidents	Harm to people	Earthworks and construction activities (e.g. overturning of crane/dropped load) adjacent to operational areas of the existing structures.	Construction activities adjacent to existing structures and live roads.	Damage to highway infrastructure leading to death and/or injury of workers and road users.	Collapse/impact leads to harm to construction and other workers and road users in the vicinity.	– Population and Human Health	Yes
25	Technological or Manmade Hazards: Industrial and Urban Accidents	Major road traffic accident	Bridge work over junction67 (Coal House) roundabout	Falling objects causes major road traffic accident. Poor sight lines due to installation of new bridges.	Construction over roadway carries construction risk and could cause disruption to traffic.	Death and / or injury to members of the public.	– Population and Human Health	Yes
28	Technological or Manmade Hazards: Industrial and Urban Accidents	Major Road Traffic Accident Collapse/damage to structure	Phased construction of bridge in immediate proximity of operational public highway	Falling objects cause road traffic accident	<ul style="list-style-type: none"> – Injury to third parties – Debris falling on public highway resulting in accident – Damage to third party utilities/services located on or near bridges 	Death and/or injury to members of the public	– Population and Human Health	Yes
38	Technological or Manmade Hazards: Transport accidents	Collapse/damage to structures	Restricted access causing difficulties with manoeuvring heavy construction plant. Increased traffic.	Construction activities adjacent to existing structures and live roads.	Damage to existing road infrastructure leading to injury of member of the public or workers.	Collapse/impact leads to harm to members of public.	<ul style="list-style-type: none"> – Population and Human Health – Cultural Heritage – Noise and Vibration 	Yes
42	Technological or Manmade Hazards: Transport accidents	Offline train derailment	Earthworks & construction adjacent to operational railway.	Working adjacent to existing railway causes a train derailment.	Increased maintenance requirements as a result of settlement during construction and long term. Inadequate maintenance/monitoring or sudden failure potentially leading to a derailment on the East Coast Main Line ECML). Materials falling on to the ECML.	ECML train derails off track.	<ul style="list-style-type: none"> – Population and Human Health – Biodiversity – Cultural Heritage 	Yes

Risk record entry number	MAD Scoping group and category	Risk event (high level)	Hazard description	Hazard sources and/or pathways	Risk description	Reasonable worst consequence if event did occur	ES topic	Is this ALARP with existing mitigation?
							<ul style="list-style-type: none"> – Geology and Soils – Landscape and Visual 	
44	Technological or Manmade Hazards: Utilities failures	Fire and/or explosion or release of harmful gas	Presence of underground services/utilities - gas, electricity,	Presence of existing utilities within the Scheme area which are nearby to residential receptors.	Striking of underground services/utilities	Fire and/or explosion affects neighbouring property and/or members of the public.	<ul style="list-style-type: none"> – Population and Human Health – Geology and Soils 	Yes

Table 4-2 - Potential major risk events – operational and/or maintenance phases

Risk Record Entry Number	MAD Scoping Group & Category	Risk Event (high level)	Hazard Description	Hazard Sources and/or Pathways	Risk Description	Reasonable Worst Consequence if Event Did Occur	Environmental Statement Topic	Is this ALARP with Existing Mitigation?
3	Natural Hazards: Geophysical	Collapse/damage to structures	Presence of unrecorded mine workings	Mine workings	Collapse of a mine workings leading to collapse of the roadway into a void.	Death and/or injury to members of the public.	<ul style="list-style-type: none"> – Population and Human Health 	Yes
7	Natural Hazards: Geophysical	Ground collapse	Presence of recorded mine workings of unknown specification	Mine workings	Collapse of mine workings.	Death and/or injury to members of the public.	<ul style="list-style-type: none"> – Population and Human Health 	Yes
9	Natural Hazards: Geophysical	Major road traffic accident	Ground subsidence leading to damage of roadway and/or associated infrastructure	Collapse of overhead structure onto carriageway. Collapse of carriageway.	The Coal Authority report (Ref 4.6) states that the Scheme Footprint is within the likely zone of influence from workings in thirteen seams of coal from shallow (<30m) to 240m bgl, with the Coal Authority database recording past and probable shallow mining below the majority of the Study Area east of junction 67 (Coal House).	Death and/or injury to multiple road users.	<ul style="list-style-type: none"> – Population and Human Health – Biodiversity 	Yes

Risk Record Entry Number	MAD Scoping Group & Category	Risk Event (high level)	Hazard Description	Hazard Sources and/or Pathways	Risk Description	Reasonable Worst Consequence if Event Did Occur	Environmental Statement Topic	Is this ALARP with Existing Mitigation?
					GI works completed by Central Alliance along the route in 2017/2018 have identified shallow coal workings within 30m from the surface which may present a stability issue to future development. Increased maintenance requirements as a result of settlement.			
18	Technological or Manmade Hazards: Industrial and Urban Accidents	Fire and/or explosion or release of harmful gas	Presence of underground gas pipework	Release of flammable gas from pipeline	Ground subsidence leading to loss of containment.	Fire and/or explosion affects neighbouring properties and/or those people in the immediate area.	– Population and Human Health	Yes
24	Technological or Manmade Hazards: Industrial and Urban Accidents	Major road traffic accident	Presence of fuel station	Flammable vapour cloud or dense smoke engulfing A1	Fire, explosion or release of flammable vapour cloud	Major road traffic incident involving loss of life or permanent injuries to multiple road users.	– Population and Human Health	Yes
42	Technological or Manmade Hazards: Transport accidents	Offline train derailment	Earthworks & construction adjacent to operational railway.	Working adjacent to existing railway causes a train derailment.	Increased maintenance requirements as a result of settlement during construction and long term. Inadequate maintenance/monitoring or sudden failure potentially leading to a derailment on the ECML Materials falling onto the ECML.	ECML train derails off track.	<ul style="list-style-type: none"> – Population and Human Health – Biodiversity – Cultural Heritage – Geology and Soils – Landscape and Visual 	Yes

TRANSBOUNDARY EFFECTS

- 4.3.8. Schedule 4 Part 5 of the EIA Regulations requires a description of the likely significant transboundary effects be provided in the ES. The Inspectorate has undertaken a Transboundary Screening to determine whether the Scheme will result in significant transboundary effects on any European Economic Area (EEA) States. The Inspectorate concluded that the Scheme was unlikely to have a significant effect either alone or cumulatively on the environment in another EEA State. The Screening Report is provided within **Appendix 4.2** of this ES (**Application Document Reference: TR010031/APP/6.3**).

4.4 SURVEYS AND PREDICTIVE TECHNIQUES AND METHODS

- 4.4.1. Data collection has been undertaken for each topic, the details of which are presented in each of the technical **Chapters 5-14** of this ES (**Application Document Reference TR010031/APP/6.1**). **Table 4-3** briefly states what has been undertaken for each technical topic.

Table 4-3 - Data collection, surveys and predictive methods

Topic	Data collection, surveys and predictive methods
Air Quality	Baseline air quality has been assessed with reference to local air quality management reporting, nitrogen dioxide diffusion monitoring, national modelling undertaken by Defra and nitrogen deposition and nitrogen oxides modelling from Air Pollution Information Systems. A detailed level assessment has been undertaken taking into account IAN 170/12, IAN174/13, IAN 175/13 and IAN 185/15.
Cultural Heritage	Data collection for the setting assessment follows Historic England guidance. A detailed desk-based assessment has been carried out in compliance with Chartered Institute for Archaeologists (CIfA) Standard and Guidance for Historic Environment Desk-based Assessment, CIfA code of conduct, Historic England guidance and DMRB.
Landscape and Visual	A detailed assessment of landscape and visual effects has been undertaken in accordance with DMRB, IAN 135/10 and the Guidelines for Landscape and Visual Impact Assessment (GLVIA). Survey work has been undertaken for both landscape and visual assessments.
Biodiversity	A Preliminary Ecological Appraisal survey was undertaken in 2015 and updated in 2018 and protected species surveys were undertaken between 2015 and 2018. Desk study data has been gathered from Environmental Records and Information Centre (ERIC) North-East, Durham Bird Club, Durham Badger Group, Durham Bat Group and Gateshead Council. The ecological assessment has been undertaken

Topic	Data collection, surveys and predictive methods
	using a modified approach detailed in the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment, DMRB and IAN 130/10.
Geology and Soils	A detailed assessment has been undertaken in accordance with DMRB including detailed site survey and ground investigation (GI) works. A review has been made of baseline soil, geological and environmental information for the corridor, including historical mapping.
Material Resources	A detailed assessment of material resources has been undertaken in accordance with IAN 153/11.
Noise and Vibration	A baseline noise survey has been undertaken at locations close to the A1 for model verification purposes. For further information see Appendix 11.6 of this ES (Application Document Reference: TR010031/APP/6.3). A detailed assessment has been undertaken in accordance with guidance contained with DMRB, Calculation of Road Traffic Noise memorandum. Data sources have included OS base mapping, 3D engineering drawings, a topographical layer, traffic flow data. construction phase information, road surface information from A-one+, Defra Noise Important Areas (NIAs).
Population and Human Health	A simple level of assessment for Population and Human Health has been undertaken following DMRB and IAN 125/15. Data has been collected from the Office for National Statistics (ONS), Local Authority Labour Market Profiles, publicly available GIS and mapping information, Local authority policies and reports and Public Health England data.
Road Drainage and the Water Environment	A detailed assessment has been undertaken in accordance with DMRB. The study has been desk based and included a review of Environment Agency Flood Maps and associated information, Environment Agency water quality data and existing drainage data on the Highways Agency Drainage Data Management System (HADDMS).
Climate	<p>A detailed assessment has been undertaken for the effects on climate ((from greenhouse gas (GHG) emissions)) using available data/information on the scale of GHG emitting activities for the baseline scenario and for the project. Calculation of the GHG emissions has used a standard emissions calculation methodology applying a suitable emissions factor.</p> <p>A detailed assessment has been undertaken on the vulnerability of the Scheme to climate change (and impacts relevant to adaptation). Historical (baseline) local climate data from the UK climate</p>

Topic	Data collection, surveys and predictive methods
	projections programme (UKCP) has been used to identify climatic trends currently impacting the Scheme.

STUDY AREAS

- 4.4.2. Study Areas have been defined individually for each environmental topic, taking account of guidance published in DMRB, the geographic scope of the potential impacts relevant to that topic or of the information required to assess those impacts. The Study Areas are described within **Chapters 5-14** of this ES (**Application Document Reference: TR010031/APP/6.1**).

BASELINE CONDITIONS

- 4.4.3. In order to identify the effects of the Scheme on the environment, it is important to understand the environment (i.e. baseline conditions) that would be affected and the changes that would occur to the baseline.
- 4.4.4. It is also necessary to predict the future baseline conditions, which in most cases is the Do-Minimum (DM) scenario. The DM scenario considers the baseline conditions in the future year if the Scheme was not built. Where relevant, the future year is defined separately for each technical topic. It takes account of any other predicted changes for example predicted growth in traffic.
- 4.4.5. As part of this step, sensitive receptors are identified. Sensitive receptors may be a physical resource or asset (e.g. a water body or a residence) or a user group (e.g. recreational users of an area or local residents).

DESIGN, MITIGATION AND ENHANCEMENT MEASURES

- 4.4.6. Where significant adverse environmental effects are identified, mitigation measures are required to remove, reduce or offset the impacts or reduce their significance. Measures to mitigate the effects of the scheme have been identified and included within the topic chapters (**Chapters 5 to 14** of this ES). Mitigation measures have also been included in the Register of Environmental Actions and Commitments (REAC) which forms part of the Outline Construction Environmental Management Plan (CEMP) (**Application Document Reference: TR010031/APP/7.4**). The Outline CEMP supports the implementation of mitigation and good construction practices.
- 4.4.7. Mitigation of potentially significant adverse environmental effects follows the hierarchy below:
- a. Avoidance – measures incorporated into the design to avoid an impact, such as changes to the horizontal or vertical alignment of the Scheme or alterations to junction and other

structure location and design or modifying the Scheme programme to avoid environmentally sensitive periods.

- b.** Reduction – incorporate measures to reduce an impact, such as landscape planting around a junction to limit views or limiting working hours to reduce nuisance impacts to nearby residents
- c.** Compensation/Remediation – where it is not possible to avoid or reduce a significant effect then offsetting measures will be considered, for example the provision of replacement habitat to replace that lost to the Scheme or remediation of contaminated soils.
- d.** Enhancement – where possible the Scheme includes environmental enhancement measures. Such measures are those over and above any avoidance, mitigation and compensation measures required to neutralise the impacts of the Scheme. Where possible, enhancement measures have been identified within each technical chapter of this ES. Further environmental enhancements may be provided as part of the detailed design where practicable.

- 4.4.8. Each of the technical chapters of this ES includes a section on the measures proposed to mitigate potential significant adverse effects of the Scheme, together with any enhancement measures.

Monitoring

- 4.4.9. Any monitoring needed to confirm that the mitigation measures put in place are working as intended is reported within the mitigation section of each of the technical **Chapters 5-14** of this ES (**Application Document Reference: TR010031/APP/6.1**).
- 4.4.10. Monitoring may sometimes be required to confirm that no environmental effect is taking place, particularly if there has been any uncertainty, or difficulties in assessing effects. Any such monitoring is also reported in the technical chapters of this ES.

4.5 GENERAL ASSESSMENT ASSUMPTIONS AND LIMITATIONS

- 4.5.1. The assumptions that have been made and limitations encountered in the preparation of this ES are as follows:
- a.** Potential impacts and their effects cannot be predicted with absolute certainty. The assessments carried out in the EIA are however based on the best information available at the time of writing and have followed appropriate, industry recognised guidance and techniques. The assessments presented in the ES therefore indicate the most likely significant effects as a result of the Scheme.
 - b.** The assessments presented in the ES have been based on the description of the Scheme as presented in **Chapter 2 The Scheme** of this ES (**Application Document Reference: TR010036/APP/6.1**). It is possible that there would be some variations to the Scheme as design and construction methodologies develop. Any changes to the Scheme would however take place within the limits of deviation as detailed within

Chapter 2 The Scheme of this ES (Application Document Reference: TR010036/APP/6.1).

- c.** The construction year has been assumed to be 2020 and the opening year 2023.
 - d.** The construction strategy detailed in **Chapter 2 The Scheme of this ES (Application Document Reference: TR010036/APP/6.1)** has been developed in consultation with the buildability support contractor. The effects of the Scheme during construction assessed within **Chapters 5-14 of this ES (Application Document Reference: TR010036/APP/6.1)** are based on this information.
 - e.** Information received from third parties is accurate, complete and up-to-date.
 - f.** The assessment has proceeded on the basis of reasonable worst case assumptions.
- 4.5.2. Assumptions and limitations have been described on a topic by topic basis, within **Chapters 5-14 of this ES (Application Document Reference: TR010036/APP/6.1)**.
- 4.5.3. Traffic model assumptions and limitations are detailed within the Transport Assessment Report (**Application Document Reference: TR010036/APP/7.3**).

LIMITS OF DEVIATION

- 4.5.4. The draft DCO contains powers of lateral and vertical deviation as shown on the Works Plan (**Application Document Reference: TR010031/APP/2.3**) and detailed in **Chapter 2, paragraphs 2.5.10 – 2.5.12 of this ES (Application Document Reference: TR010036/APP/6.1)**. However, the existing geometry of the A1 within the Scheme Footprint is such that it can be expected that the design shown on the Engineering Section Drawings (**Application Document Reference: TR010031/APP/2.5**) and General Arrangement Plan (**Application Document Reference: TR010031/APP/2.6**) that accompany the Application will not vary materially in either the horizontal or vertical plane. As such, the reference design shown on those drawings has been assessed for the purposes of EIA. On this basis the outputs of the assessment are not considered likely to change materially as a result of the power of deviation.

4.6 SIGNIFICANCE CRITERIA

- 4.6.1. The approach to assessment has been based on the guidance in DMRB Volume 11 Section 2 Part 5 (**Ref 4.7**). In accordance with the DMRB the assessment covers the likely significant effects arising from the permanent and temporary, direct, indirect, secondary, cumulative, short, medium and long-term, positive and negative effects of the Scheme.
- 4.6.2. The significance of effect is determined by combining the value or sensitivity of a receptor with the magnitude of change as shown in **Table 4-4**. It should be noted that effects, whether adverse or beneficial, assessed as “moderate” or above significance are deemed to be significant. Effects determined to be slight or neutral are deemed to be not significant. Any deviation from this approach has been clearly documented in the relevant chapter of this ES.

- 4.6.3. The significance of effects within **Chapter 15 Cumulative and Combined Assessment** of this ES (**Application Document Reference: TR010031/APP/6.1**) was evaluated in a similar way as that described above. However, for this assessment when determining whether an effect is considered significant, effects of “minor” or above significance are taken into consideration, to account for the potential for multiple ‘non-significant’ to combine to result in an overall significant cumulative effect. Cumulative and in-combination effects are described further in **Chapter 15 Cumulative and Combined Assessment** of this ES (**Application Document Reference: TR010031/APP/6.1**).
- 4.6.4. Table 4-4 **Table 4-4** below which follows DMRB guidance (**Ref 4.1**) (major, moderate, minor, negligible, no change). The assessment of significance is carried out by taking into account design, mitigation and enhancements measures that have been identified.
- 4.6.5. Each specific environmental topic may use slightly different significance criteria as outlined in DMRB Volume 11 Section 3 (**Ref 4.1**). In addition, DMRB Volume 11 and IAN 125/09 (**Ref 4.2**) advise on the method to be used for each specific environmental assessment. For the topics in which there is no such guidance, the effects have been identified using professional judgement.
- 4.6.6. It should be noted that effects, whether adverse or beneficial, assessed as “moderate” or above significance are deemed to be significant. Effects determined to be slight or neutral are deemed to be not significant. Any deviation from this approach has been clearly documented in the relevant chapter of this ES.
- 4.6.7. The significance of effects within **Chapter 15 Cumulative and Combined Assessment** of this ES (**Application Document Reference: TR010031/APP/6.1**) was evaluated in a similar way as that described above. However, for this assessment when determining whether an effect is considered significant, effects of “minor” or above significance are taken into consideration, to account for the potential for multiple ‘non-significant’ to combine to result in an overall significant cumulative effect. Cumulative and in-combination effects are described further in **Chapter 15 Cumulative and Combined Assessment** of this ES (**Application Document Reference: TR010031/APP/6.1**).

Table 4-4 - Matrix for determining the significance of effect

		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

		Magnitude of Impact (Degree of Change)				
		No change	Negligible	Minor	Moderate	Major
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

- 4.6.8. In accordance with the DMRB the assessment will cover the likely significant effects arising from the permanent and temporary, direct, indirect, secondary, cumulative, short, medium and long-term, beneficial and adverse impacts of the Scheme.

4.7 DUPLICATION OF ASSESSMENT

- 4.7.1. A Habitats Regulations Assessment (HRA) (**Appendix 8.2** of this ES (**Application Document Reference: TR010031/APP/6.3**)) and FRA (**Appendix 13.1** of this ES (**Application Document Reference: TR010031/APP/6.3**)) have been carried out to support the information presented within this ES. These documents have been produced by the same teams as those carrying out the EIA and the assessments are complimentary rather than duplicated.

REFERENCES

Ref. 4.1 Design Manual for Roads and Bridges (DMRB). Volume 11 Section 3. Available at: <http://www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section3.htm> (accessed 12/12/2018).

Ref. 4.2 Highways England (2008). Interim Advice Note 125/09. Supplementary guidance for users of DMRB Volume 11 'Environmental Assessment'. Available at: <http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian125.pdf> (accessed 12/12/2018).

Ref. 4.3 The Infrastructure Planning (Environmental Impact Assessment) Regulations (2017). Available at: <http://www.legislation.gov.uk/uksi/2017/572/contents/made> (accessed 12/12/2018).

Ref. 4.4 The Planning Act 2008. Available at: <https://www.legislation.gov.uk/ukpga/2008/29/contents> (accessed 12/12/2018).

Ref. 4.5 Department for Transport (2014). Policy paper. National Policy Statement For National Networks. Available at: <https://www.gov.uk/government/publications/national-policy-statement-for-national-networks> (accessed 12/12/2018).

Ref. 4.6 Highways England (2018). PCF Stage 3 Coal Mining Risk Assessment. Report number: HE551462-WSP-VGT-ZZ-RP-VG-0001.

Ref. 4.7 Design Manual for Roads and Bridges (DMRB). Volume 11 Section 2 Part 5. Published August 2008. Available at: <http://www.standardsforhighways.co.uk/ha/standards/dmr/vol11/section2/ha20508.pdf> (accessed 12/12/2018).

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