A1 in Northumberland: Morpeth to Ellingham

Scheme Number: TR010041

6.1 Environmental Statement - Appendix 4.3 Major Accidents and Disasters Assessment

APFP Regulation 5(2)(a)

Planning Act 2008

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

June 2020

Infrastructure Planning

Planning Act 2008

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

The A1 in Northumberland: Morpeth to Ellingham

Development Consent Order 20[xx]

Environmental Statement

Regulation Reference:	APFP Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010041
Application Document Reference	TR010041/APP/6.1
Author:	A1 in Northumberland: Morpeth to Ellingham Project Team, Highways England

Version	Date	Status of Version
Rev 0	June 2020	Application Issue

Major Accidents and Disasters Assessment

A1 in Northumberland: Morpeth to Ellingham

Part A: Morpeth to Felton

CONTENTS

TABLES

FIGURES

APPENDICES

1. INTRODUCTION

1.1. REQUIREMENT FOR ASSESSMENT

1.1.1. This Report addresses the potential vulnerability of the A1 in Northumberland: Morpeth to Ellingham Scheme (hereafter referred to as the Scheme), Part A: Morpeth to Felton (hereafter referred to as Part A) to major accident(s) and/or disaster(s) as required by the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) (**Ref. 1**).

1.1.2. The EIA Regulations 2017 require that: 'A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to EU legislation such as Directive 2012/18/EU of the European Parliament and of the Council(c) or Council Directive 2009/71/Euratom(d) or UK environmental assessments may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.'

1.2. SCHEME LOCATION AND DESCRIPTION

1.2.1. The Part A location and description is included in **Chapter 2: The Scheme, Volume 1** of this ES (**Application Document Reference: TR010041/APP/6.1**).

1.3. PURPOSE OF THE REPORT

1.3.1. This Major Accidents and Disasters (hereafter referred to as "Major Events") Assessment Report has been produced in accordance with the EIA Regulations 2017 (**Ref. 1**), the Design Manual for Roads and Bridges (DMRB) (Volume 11, Section 2, Part 5) (**Ref. 2**).

1.3.2. This report describes the assessment methodology, any primary and tertiary mitigation adopted for the purposes of the assessment and a summary of the expected significant effects resulting from the vulnerability of Part A to the risk of Major Events taking into account relevant legislation and guidance applicable in England. Where appropriate, this description includes the further mitigation measures required to prevent, reduce or offset any significant negative effects, the preparedness for and proposed response to emergencies, and the expected residual effects after these measures have been employed.

1.3.3. This report addresses responses from the Planning Inspectorate in relation to Major Events within the Scoping Opinion Section 3.3 (**Ref. 3**) received by The Applicant in March 2018, including formal responses from statutory consultees. Based on the feedback in the Scoping Opinion, the scoping exercise was revisited (refer to **Section 6**) to inform the Major Events assessment.

1.3.4. This report (and its associated figures and appendices) is intended to be read as part of the wider Environmental Statement (ES), with particular reference to **Chapter 5: Air Quality, Chapter 6: Noise and Vibration, Chapter 7: Landscape and Visual Amenity, 8:Cultural Heritage, Chapter 9: Biodiversity, Chapter 10: Road Drainage and the Water Environment, Chapter 11: Geology and Soils, Chapter 12: People and Communities, Chapter 13: Material Resources,** and **Chapter 14: Climate**, **Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**).

1.4. COMPETENT EXPERT EVIDENCE

1.4.1. This report has been prepared by professionals who have sufficient expertise to ensure the completeness and quality of this major events assessment. **Appendix A** provides a list of qualifications, professional memberships and experience for the author and reviewer of this assessment.

1.5. LEGISLATIVE AND POLICY FRAMEWORK

LEGISLATION

International

1.5.1. Paragraph 15 of Directive 2014/52/EU (**Ref. 4**) states:

"In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment. For such projects, it is important to consider their vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment."

National

1.5.2. The above EU Directive has been transposed into UK law through the EIA Regulations 2017 (**Ref. 1**). Schedule 4 Paragraph 8 of the EIA Regulations 2017 require that the ES include:

"(8). A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to EU legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or UK environmental assessments may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies."

1.5.3. It is worth noting that the UK approach has removed the word 'natural' with respect to "disasters". An article written by a registrant of the EIA Quality Mark Registrant Scheme of

the Institute of Environmental Management and Assessment (IEMA) suggests that given the intention underlying this aspect of the EU Directive, both manmade and natural disasters should be considered (**Ref. 5, 6, 7**).

1.5.4. The applicable legislative framework covering the design, construction, operation and maintenance of Part A is summarised as follows, further details are presented in **Appendix B.**

a. Health and Safety at Work etc. Act 1974 (HSWA) (**Ref. 8**)
b. Construction (Design and Management) Regulations 2015 (CDM) (**Ref. 9**)

POLICY

1.5.5. There are no policy documents applicable to this report at the time of writing.

2. ASSESSMENT METHODOLOGY

2.1. SCOPE

2.1.1. The Major Event assessment has considered the construction, operation and maintenance phases of Part A. It is considered highly unlikely that Part A would be demolished after its design life as the road is likely to have become an integral part of the infrastructure in the area. In the unlikely event of Scheme demolition, this would be part of the relevant statutory process at that time. The demolition phase of Part A has therefore not been assessed.

2.1.2. The assessment of significant adverse effects on receptors has considered all factors defined in the EIA regulations, specifically population and human health, biodiversity, land, soil, water, air and climate and material assets, cultural heritage and the landscape.

2.1.3. Certain receptors have been excluded from the assessment, for the reasons described in **Table 2-1** below.

Table 2-1 - Excluded Receptors

Excluded Receptors	Reason for Exclusion
Employees of Highways England and/or its suppliers, whether during construction, operation or maintenance of Part A.	Highways England's commitment and obligations to manage risks to employees are described in other documents (for example Highways England's H&S management system, Raising the bar initiative).
Members of the public who are wilfully trespassing, for example on areas designated as a construction site.	Outside the occupier's legal requirements under the Occupier's Liability Act 1984 (**Ref. 10**).

2.2. SCOPING METHODOLOGY

2.2.1. In response to the Planning Inspectorate Scoping Opinion a supplementary scoping exercise was undertaken in order to provide evidence for those Major Events that should be taken forward into the assessment. The methodology detailed was followed:

2.2.2. **Stage 1:** A Long List of possible Major Events was developed. This list drew upon a variety of sources, including the UK Government's Risk Register of Civil Emergencies (**Ref. 11**). Low likelihood and low consequence events were scoped out as these events are unlikely to result in significant adverse effects as they do not fall into the definition of a Major Event. Highly likely and low consequence events were also scoped out as they will not lead to significant adverse effects. Furthermore, high likelihood and high consequence events were

also scoped out, as it is assumed that existing legislation and regulatory controls would not permit Part A to be progressed under these circumstances.

2.2.3. **Stage 2:** The Long List was reviewed for any potential accidents and disasters that were considered highly unlikely to occur due to the location of Part A based on information provided by the environmental topic teams and the use of information sources related to Major Events (**Ref. 12, 13, 14, 15, 16**). If an event type cannot occur due to the location of Part A, then a 'N' was indicated under the location risk column. If it was then a 'Y' was given (e.g. a Major Event type of urban accidents/fires would not be relevant for a scheme located in a rural area).

2.2.4. **Stage 3:** Remaining items in the Long List were considered based on the sources identified in the **Section 2.6** of this document and taking into account the proposed use of the development and phase (i.e. construction, operation, maintenance). If the Major Event was not associated with the proposed use of the development, either at the construction or operation or maintenance phase, a 'N' was indicated. If it is, then a 'Y' was given. Where all columns of an entry in the Long List received a 'N', for an identified Major Event type, this Major Event type was scoped out. If a 'Y' was identified in any of the columns, a Major Event was scoped in for inclusion in the assessment.

2.2.5. Those Major Events that were scoped in make up the Short List of Major Events (refer to **Section 6.3**) and have undergone further detailed assessment.

2.3. METHOD OF BASELINE DATA COLLECTION

2.3.1. The assessment has utilised baseline information collected from other chapters of this ES to define the receptors and Part A's vulnerability to a major event. In particular, baseline information from chapters in the ES (e.g. climate, population and human health, biodiversity, and road drainage and the water environment) and other documents (e.g., traffic and transport (**Ref. 17**)) are pertinent to the assessment.

2.3.2. In accordance with Schedule 4 Paragraph 8 of the EIA Regulations 2017 (**Ref. 1**), available safety assessments undertaken for Part A have been used to inform the identification and assessment of likely significant environmental effects. For the purposes of Part A these include, for example, Construction, Design and Management (CDM) risk registers and hazard identification studies current at the time of undertaking the assessment.

2.3.3. The assessment has been based on a review of available documentation and regulatory requirements.

2.3.4. Additional baseline information has been obtained on features external to Part A which could contribute a potential source of hazard to Part A. This information was obtained from a desk based study. Such features included but were not limited to:

a. Presence of COMAH sites.
b. Potentially hazardous ground conditions.
c. Proximity to other infrastructure (road, rail, aviation, energy).

2.4. ASSESSMENT METHODOLOGY

2.4.1. To date, there is no specific guidance on how to consider major accidents and disasters within the context of Environmental Impact Assessment (EIA). However, the assessment takes account of emerging EIA good practice, which refers to other relevant documentation, including the Cabinet Office's National Risk Register of Civil Emergencies (**Ref. 11**).

2.4.2. The assessment of major events will be achieved through a review of available documentation and regulatory requirements; the EIA will not involve assessment from 'first principles' as it is recognised that existing legislation and health and safety requirements already identify risks and help to protect human beings and the environment (**Appendix B**).

2.4.3. The assessment will present any identified risks along with whether they are managed to be As Low As Reasonably Practicable (ALARP) or require further precautionary mitigation actions beyond those already integrated into the design and execution of Part A (for example the **Outline Construction Environmental Management Plan** (**Outline CEMP**) (**Application Document Reference: TR010041/APP/7.3**).

2.4.4. The potential for identified relevant major events to result in a significant adverse environmental effect have been evaluated using a risk based approach. The approach has considered the environmental consequences of a Major Event, the likelihood of these consequences occurring, taking into account planned design and embedded mitigation, and the acceptability of the subsequent risk to the environment. The following process was applied to each of the scoped in major event categories:

a. Identifying risks
b. Screening these risks
c. Defining the impact
d. Assessing the likelihood
e. Assessing the risk

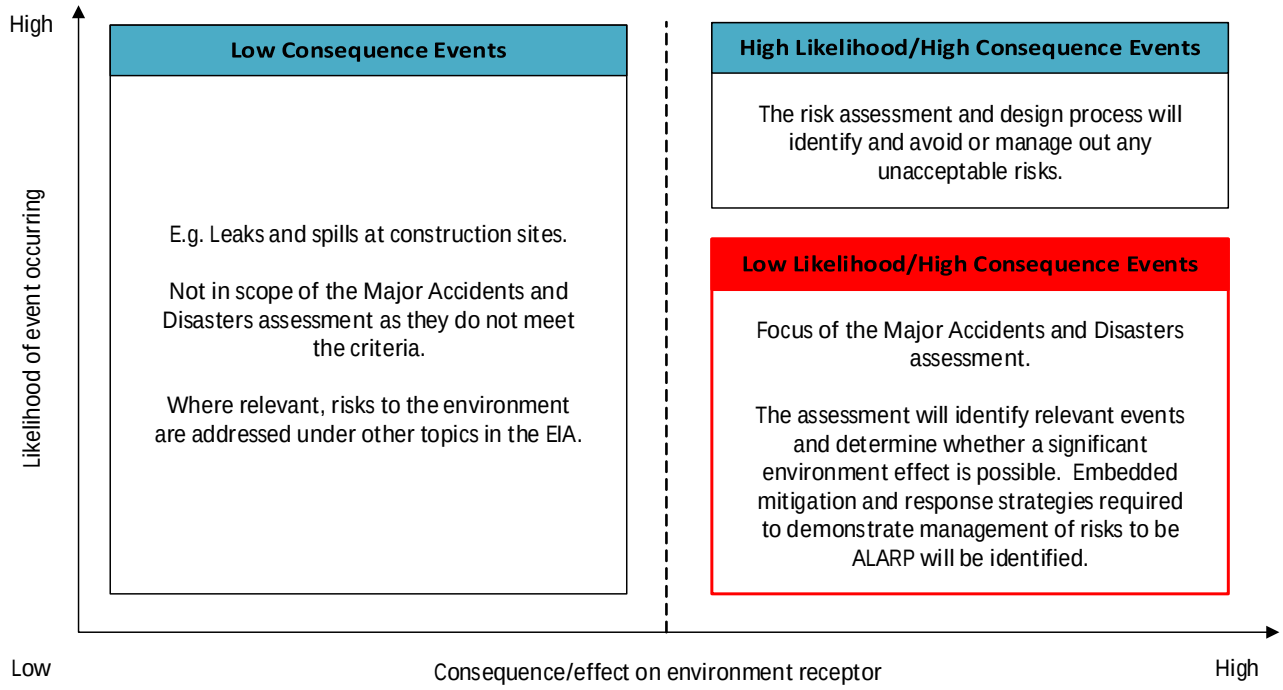
IDENTIFY RISKS

2.4.5. The major events considered in the assessment are rare events.

2.4.6. All low consequence events, whatever their likelihood, do not meet the definition of major events (**Section 7**). For example, minor spills which may occur during construction, but would be limited in area and volume and temporary in nature do not meet the definition of a major accident. Such minor events would be dealt with under the main contractor's or managing agent contractor's (MAC) Environmental Management System (EMS) and do not fall within the scope of this assessment.

2.4.7. This assessment focuses on low likelihood but potentially high consequence events as illustrated in **Figure 1**.

Figure 1 – Graphical Representation of Major Accidents and Disasters Consequence Significance



2.4.8. Low likelihood is defined for the purposes of this assessment, as:

a. May occur during the lifetime of Part A, so no more than once in 10 years for the construction phase, and no more than once in 100 years for the operational phase.

2.4.9. This is an upper boundary for low likelihood. Very low likelihood events will also be included in the assessment, which may only occur at most once in every 1,000 years. Mitigation measures will reflect what is reasonable for such rare events, considering their potential consequence, within the guiding principle of risks being As Low as Reasonably Practicable (ALARP).

2.4.10. High consequence events are considered to lead to a significant adverse effect.

2.4.11. The risk identification process has used existing sources of information wherever possible, as described in **Section 2.3**, such as risk assessments undertaken for Part A as part of other processes (many of which are required by law) or Risk Events identified within the UK's current National Risk Register. No additional risk assessments have been undertaken and the risk identification activity has focused on collating and reviewing the existing sources.

2.4.12. In order to identify whether a Risk Event has the potential to be a Major Event, which also has the potential to have a significant adverse effect on an environmental receptor, three components need to be present: a source, a pathway (between source and receptor) and a

receptor. As such, and as recommended by Defra (**Ref. 18**), the assessment uses the following conceptual model:

a. The **source** is the original cause of the hazard, which has the potential to cause harm
b. The **pathway** is the route by which the source can reach the receptor
c. The **receptor**, which is the specific component of the environment that could be adversely affected, if the source reaches it

2.4.13. Risk Events which do not have all three components have been screened out from the assessment.

SCREEN RISKS

2.4.14. The following screening process has been used to identify those Risk Events which would require further consideration within the assessment:

a. Is there a potential source, and/or pathway and/or receptor as defined in **Paragraph 2.4.12** above? If not, no further assessment required.
b. Is there a relevant environmental receptor (**Section 2.1**) present in the locations where the risk event could occur, and a pathway whereby the source of harm can reach the receptor? If not, no further assessment required.
c. Does the potential impact on the environmental receptor meet the definition of a significant adverse effect given in **Paragraph 2.4.10**? If not, no further assessment required.

2.4.15. For those Risk Events which are not screened out during the three-step process, the following assessment methodology has been used. The assessment forms the basis for recommending additional mitigation measures, as appropriate.

DEFINE IMPACT

2.4.16. Several mechanisms are in place to reduce the vulnerability of Part A to major events or mitigate significant effects on the environment should they occur. All measures to manage and reduce risk of significant adverse effects occurring as a result of the vulnerability of Part A to major events are considered to be primary mitigation measures for the purposes of the assessment. It has been assumed that:

a. The design of Part A will take into consideration the relevant potential mitigation measures set out in National Policy Statement for National Networks (NPS NN) (**Ref. 19**).
b. The design of Part A will be subject to relevant Road Safety studies and actions identified integrated into the final design to reduce risks to as low as reasonably practicable.
c. The design, installation, commissioning, operation and maintenance of plant, drainage systems, equipment and machinery, including associated systems, will take into account Good Engineering Practice (GEP).
d. The construction stage(s) of Part A will be managed through the implementation of the Construction Phase Plan and measures within the **Outline CEMP** (**Application Document Reference TR010041/APP/7.3**).

2.4.17. This framework and the measures therein of relevance to the assessment are described in the ES.

2.4.18. A reasonable worst case environmental impact(s) has been identified for each scoped-in Risk Event. Impacts have been identified in consultation with relevant disciplines for each environmental topic within the ES. The environmental impacts are identified through a qualitative process which seeks to answer the question 'could this event constitute a major accident or disaster in terms of the definitions provided (refer to **Section 1.4**). Where relevant, specific sensitive receptors around Part A are considered (refer to **Table 5-1**Error! Reference source not found.). The Risk Record (**Appendix D**), records the outcome of this process.

ASSESS RISK

2.4.19. The likelihood of the reasonable worst case environmental effect(s) occurring has been evaluated taking into account the following:

a. the likelihood of the risk event occurring considering the measures already embedded into the design and execution of Part A.
b. the likelihood that an environmental receptor is affected by the risk event.

2.4.20. Likelihood assessments evaluate whether the effect (for example, loss of life) is a possible outcome of the risk event.

2.4.21. This evaluation refers to existing risk assessments as well as consultation with relevant discipline specialists.

2.4.22. The assessment of the risk has been carried out using a major accidents and disasters assessment tool, developed by WSP. Where likely significant adverse effects are identified, mitigation measures must be in place, commensurate with the likelihood of the event occurring. The assessment considers, in consultation with relevant disciplines, whether the risk to the environmental receptor is managed to be ALARP with the existing measures. If gaps are identified, where the existing measures do not represent management of risks to an environmental receptor to be ALARP, then additional measures would be required. The Risk Record presented in **Appendix D** records the outcome of the assessment.

APPRAISE RISK MANAGEMENT OPTIONS

2.4.23. Risk management options fall into the following categories:

a. Eliminate (or 'avoid') the risk, by adopting alternative processes in order to eliminate the source of the hazard, or remove the receptor.
b. Reduce the risk by adapting proposed processes such that either the likelihood or the impact of the risk event can be reduced.
c. Isolate the risk, by using physical measures to ensure that should the risk event occur, it can be effectively isolated such that there is no pathway.
d. Control the risk, by ensuring that appropriate control measures are in place (for example emergency response) so that should a risk event occur, it can be controlled and

managed appropriately. The EIA mitigation hierarchy of repair and compensate any significant damage to environmental receptors may then apply following a control measure.

e. Exploit the risk, if it presents potential benefits or new opportunities.

2.4.24. As safety risks will be required to be adequately addressed within the regulatory framework for Part A, it is not anticipated that significant residual effects will be identified as an output of the assessment.

2.5. ASSESSMENT OF POTENTIAL MAJOR EVENTS

2.5.1. The process involved the use of professional judgement taking into account the following factors:

a. The geographic extent of the effects. Effects beyond the project boundaries are more likely to be considered significant.
b. The duration of the effects. Effects which are permanent (specifically irreversible) or long lasting are considered significant.
c. The severity of the effects in terms of number, degree of harm to those affected and the response effort required. Effects which trigger the mobilisation of substantial civil emergency response effort are likely to be considered significant.
d. The sensitivity of the identified receptors.
e. The effort required to restore the affected environment. Effects requiring substantial clean-up or restoration efforts are likely to be considered significant.

2.6. DATA SOURCES

2.6.1. The following data sources were used in the preparation of this assessment report:

a. Cabinet Office, National Risk Register of Civil Emergencies, 2017 Edition (**Ref. 11**)
b. The International Disaster Database (**Ref. 13**)
c. British Geological Survey Geo Index Onshore (**Ref. 14**)
d. Prevention Web Europe: Tsunamis Hazard Map (**Ref. 15**)
e. Met Office (2013) England and Wales drought 2010-2012 (**Ref. 16**)
f. Environment Agency (January 2012) Yorkshire and North-East Region Drought Plan (**Ref. 20**)
g. Northumbrian Water Draft Drought Plan 2018, Northumbrian water, August 2017 (**Ref. 21**)
h. Morpeth to Felton (Section A) Alignment Options - Technical Appraisal Report (**Ref. 17**)
i. A1 in Northumberland Morpeth to Ellingham Safety Plan (SGAR3) (**Ref. 22**)
j. Health & Safety Executive's Planning Advice Web App (**Ref. 23**)
k. Health & Safety Executive's COMAH 2015 Public Information Search (**Ref. 24**)

2.7. POLICY AND GUIDANCE

2.7.1. There is currently no applicable policy relating to the methodology for assessing Major Events.

2.7.2. There is currently no published guidance for the application of the legal requirements to Major Events. However, selected relevant guidance for risk assessment methodologies is summarised as follows; (further details are presented in **Appendix B)**.

a. Defra (2011) 'Guidelines for Environmental Risk Assessment and Management' (**Ref. 18**)
b. Chemical and Downstream Oil Industries Forum, (2013), Guideline - Environmental Risk Tolerability for COMAH Establishments (**Ref. 25**)
c. The International Standards Organization's ISO 31000: 2009 Risk Management - principles and guidelines (**Ref. 26**)

2.7.3. To date, there is no specific guidance on how to consider Major Events within the context of EIA. However, WSP has developed and used a process which takes account of emerging EIA good practice (**Ref. 2, 5, 6, 7, 18**) which refers to other relevant documentation, including the Cabinet Office's National Risk Register of Civil Emergencies (**Ref. 11**) and experience in major accident hazard identification when preparing Safety Reports relating to the prevention and control of major accident hazards (**Ref. 27, 28, 29, 30, 31, 32, 33**).

3. ASSUMPTIONS AND LIMITATIONS

3.1.1. Key assumptions for the major accidents and disasters assessment are that:

a. The modifications to the NGN gas pipeline will be managed and controlled by the Operator as part of the Safety Report required under the relevant regulations. (**Ref. 34, 35, 36**).

b. Part A is being designed and its implementation guided by other industry standards and codes, many of which are mandatory. These require infrastructure and systems to be designed so that risks to people and the environment are either eliminated or reduced to levels that are ALARP.

c. Environmental effects associated with unplanned events that do not meet the definition of a major accident and / or disaster e.g. minor leaks and spills that may be contained within the construction sites are addressed in the topic chapters and not in this assessment.

d. It is recognised that the management framework for Part A is not fully defined at this stage; however, a presumption of standard practice and regulatory compliance within the adopted management framework has been assumed and will be developed following the appointment of the EPC contractor.

e. The design of Part A will take into consideration the relevant potential mitigation measures set out in the NPS NN.

f. The design of Part A will be subject to relevant Road Safety studies and actions identified integrated into the final design to reduce risks to as low as reasonably practicable.

g. The design, installation, commissioning, operation and maintenance of plant, drainage systems, equipment and machinery, including associated systems, will take into account Good Engineering Practice (GEP).

h. The environmental management of the construction stage(s) of Part A would follow the measures as detailed within the Construction Phase Health and Safety Plan and Construction Environmental Management Plan (CEMP).

3.1.2. The following limitations apply to this assessment:

a. No site visits were conducted, the assessment was desk-based.

b. No modelling or detailed calculations were undertaken, the qualitative assessment took the form of ‘sign-posting’ to existing risk assessments, and assessment of potential gaps or residual risks which are not considered to be managed using the ALARP principle.

c. Where information was not available, professional judgement was used to reach a conclusion.

d. In accordance with good safety management principles, it was assumed that all risks that have the potential to be major accidents or disasters, and could impact a local environmental receptor, would be managed using the ALARP principle.

4. STUDY AREA

4.1.1. The Study Area for Major Events has been developed based on professional judgement as there is no specific regulatory guidance nor significant precedent / standardised methodology.

4.1.2. At the supplementary scoping stage, a 5 km corridor either side of the centre line of Part A was used in order to capture internal and external influencing factors which may have high adverse consequences on Part A. The following factors and associated distances were adopted for setting the Study Area in order to capture:

a. Manmade features

i. COMAH facilities within 5 km
ii. Major accident pipelines within 1 km
iii. Fuel retail sites (including LNG, LPG) within 1 km
iv. Rail infrastructure within 1 km
v. Transmission (gas, electrical, oil/fuels) crossing the development limits

b. Natural features with the potential to create risks within:

i. 3 km (chiefly hydrological (dam failure) and geological (seismic activity))
ii. 1 km (chiefly hydrological (flood risk) and geological (unstable ground conditions, contamination)

4.1.3. The extent of the Study Area used for the Major Events assessment is a narrower area that that used for the supplementary scoping study as the updated scoping work found that the key influencing external factors lay within a 1 km corridor either side of the centre line of Part A.

5. BASELINE CONDITIONS

5.1.1. The baseline relevant to this topic comprises:

a. features external to Part A that contribute a potential source of hazard to Part A
b. sensitive environmental receptors at risk of significant effect
c. current (without Part A) major accident and disaster risks

5.1.2. Within Part A, the existing A1 dual carriageway is located in an area of rural / agricultural land which is managed through standard agricultural practices as well as several areas of Greenbelt.

BASELINE FEATURES THAT CONTRIBUTE A POTENTIAL SOURCE OF HAZARD

5.1.3. As far as is reasonably practicable, the route avoids existing features that have the potential to present a hazard to the construction or operation of Part A. However, there is a major accident hazard pipeline within Part A, namely National Grid Gas PLC Feeder Main 13 Simprim/Corbridge.

5.1.4. Features external to Part A that lie within 1 km of Part A (including those detailed above) that present a potential source of hazard, either during construction or operation are detailed in **Table 5-1** below:

Table 5-1 – Major Events Baseline

Name	Hazard Source or Receptor	Comment	Regulatory Status of Feature	Approximate Distance & Direction from Part A
National Grid transmission pipeline	Hazard	High pressure gas pipeline	Major Accident Hazard	Within Part A
	Receptor			
Shell Petrol Station, Morpeth	Hazard	Fuel retailing site	Licenced petroleum site	125 m south east
Eshott Airfield, Felton	Hazard	Working airfield with significant flammable fuel storage	-	100 m east
Animal burial pit	Hazard	Foot and mouth	-	70 m west of carriageway
- River Coquet - Longdike Burn (and the Poxtondean Burn that discharges into the Longdike Burn) - Earsdon Burn - River Lyne - Floodgate Burn	Hazard	Significant surface watercourses	-	Within Part A
	Receptor			
Flood zones	Hazard	Majority of the Part A alignment is located in the low-risk Flood Zone 1 Sections of Part A located in the medium risk Flood Zone 2 and the high-risk Flood Zone 3	-	Within Part A
A1 Felton to Morpeth	Hazard	Observed fatal collisions on this section of the A1 are in line with COBA estimated levels, while overall KSI numbers are below COBA estimates. In general, the A1 between Morpeth and Felton does not appear to have a significant collision issue.	GB dual carriageway average = 7.24	Within Part A
		% fatal collisions = 1.04%	GB dual carriageway average = 1.69%	

Baseline Accident and Disaster Risks

5.1.5. Major accident and disaster risks relevant to the baseline in the absence of Part A include extreme weather events and associated flooding and road traffic collisions. Baseline 'without project' conditions are described in detail in the following ES chapters: **Chapter 9: Geology and Soils**, **Chapter 10: Road drainage and the Water Environment** and **Chapter 14: Climate, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**). Those aspects of most relevance to the major accidents and disasters chapter are summarised below.

Surface Water Floods

5.1.6. Historic flood records used in the baseline condition section of **Chapter 10: Road Drainage and the Water Environment, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) explain events have been recorded in the vicinity of Part A and the HADDMS (Highways Agency Drainage Data Management System) online database indicated that the Morpeth to Felton section of the existing A1 has eight documented historical surface water flood events of which 2 are detailed as high severity events resulting in the total closure of the carriageway.

5.1.7. Areas of shallow groundwater are present along some parts of the route.

Droughts

5.1.8. Droughts are caused by insufficient rainfall and in the UK context, a drought is defined as at least 15 consecutive days where there is no more than 0.2 mm of precipitation.

5.1.9. For England and Wales, the drought of 2010 to 2012 was one of the ten most significant droughts of one to two years duration in the last 100 years. The drought was due to a sequence of dry months from winter 2009/10 to March 2012, particularly in the spring, autumn and winter seasons. The drought resulted in concerns for farming due to the very dry ground, water resources and the environment generally.

5.1.10. Between April 2010 and March 2012, the Part A area only received 65-85% of rainfall compared with the 1981-2010 average (**Ref. 16**).

5.1.11. Major impacts from drought is not expected in the North-East Area although catchments not supported from reservoirs such as Kielder can be expected to see reduced flows and public concern may be raised the area of Part A (**Ref. 20**).

5.1.12. Northumbrian Water investment in Kielder reservoir, the largest man-made reservoir in Europe, means that restrictions on customers use of water, even during the most severe droughts with the area of Part A, should be not necessary. Northumbrian Water's Levels of Service for "Appeal for Restraint" frequency is 1 in 20 years, whilst "Temporary Water Use Ban" and "Drought Order ban" frequency are never (**Ref. 21**).

Hurricanes, Storms and Gales

5.1.13. Hurricanes cannot form in or around the UK as the sea temperatures are not warm enough to sustain a wind of at least 120 km/h, which is one of the measurements used to classify a hurricane. However, deep depressions that were originally hurricanes are experienced in the UK.

5.1.14. According to the latest meteorological data (2017) from Newcastle Airport used in the air quality dispersion modelling for Part A, the greatest wind speed recorded was 83.52 km/h.

Extreme Temperatures: Heatwaves, Low (sub-zero) Temperature and Heavy Snow.

5.1.15. Between 1981 and 2010, there were 7 occurrences where summer mean temperatures exceeded 22.3°C on five or more consecutive days and the maximum monthly mean temperature was 18.1°C.

5.1.16. Between 1981 and 2010, there have been 1,489 days with a maximum minimum temperature below zero degrees Celsius and the minimum monthly mean temperature was 2.2°C.

5.1.17. Between 1981 and 2010, there were 467 days with snow lying at 0900 hours however, there are no records from the Met Office of the depth of snow.

Poor Air Quality (Construction Phase)

5.1.18. According to **Chapter 5: Air Quality, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**), current baseline air quality within Part A does not exceed the relevant air quality objectives for NO_x, NO_2, PM_{10} and $PM_{2.5}$. During the construction phase it is anticipated that with appropriate mitigation (specifically measures detailed within the **Outline CEMP** (**Application Document Reference TR010041/APP/7.3**)) air quality would remain below the relevant air quality objectives for NO_x, NO_2, PM_{10} and $PM_{2.5}$.

Biological - Diseases

5.1.19. There is an animal burial pit 70 m west of the existing carriageway over which construction will take place as part of Part A.

Industrial Accidents

5.1.20. There are no major accident hazard installations industrial located in close proximity to Part A (**Ref. 37**).

5.1.21. National Grid Gas PLC Feeder Main 13 Simprim/Corbridge crosses Part A and the proposed route.

5.1.22. The Coal Authority records indicate that there are 4 mine entries, and areas of recorded and likely unrecorded coal mine workings at shallow depth along the improvement scheme route (**Ref. 38**) and the **Chapter 11: Geology and Soils, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) have identified these as Methane producing ground gas sources with risk of causing a gas explosion and/or land instability.

5.1.23. Eshott Airfield, located at Felton, Northumberland, NE65 9QJ, is an operational airfield located 100 m on the east side of Part A. Facilities include two tarmac runways, a grass strip, a dedicated F34 JetA1 helicopter pad, hangarage for 80+ aircraft, flight training school, maintenance, livery spraying and running refuels. Previously an RAF base/airfield construction in World War II (WWII). Potential for aircraft accident and/or major fire associated with aviation fuel storage, also unexploded ordnance from WWII within the vicinity of the airfield.

5.1.24. There is a petrol station within100m at Fairmoor which has the potential for major fire which could impact Part A.

Pollution Incidents

5.1.25. According to the **Preliminary Sources Study Report (PSSR)** (**Appendix 11.1**, **Volume 7** of this ES **(Application Document Reference: TR010041/APP/6.7**)) there was 1 recorded pollution incident within the PSSR Study Area, it involved commercial waste. The **Ground Investigation Report** (**Appendix 11.2**, **Volume 7** of this ES **(Application Document Reference: TR010041/APP/6.7**)), including contaminated land assessment, indicates there are limited sources of contamination along the route and a potential source of contamination has been identified in an area of former RAF land (which includes sources in the near vicinity such as a former below ground fuel installation), to the north of the existing Longdike Burn bridge crossing.

5.1.26. River Lyne has a Water Framework Directive classification of poor for ecology. The Longdike Burn is also classified as moderate for ecology. Although the River Coquet has an overall Water Framework Directive classified of good, the River Coquet Site of Special Scientific Interest (SSSI), unit 5, Swarland Burn to Coquet Mouth has been determined to be ‘Unfavourable-Recovering’ by Natural England.

Transport Accidents

5.1.27. There have been 58 transport accidents over the 5-year period 2011-2015 involving personal injuries reported on the existing section of the A1 which is being widened by Part A. These resulted in a total of 105 casualties, two fatalities, 12 serious casualties and 91 slight casualties. This section of the A1 has an average FWI score of 0.82 for the 5-year period (**Ref**. **22**).

Electricity, Gas, Water Supply or Sewerage System Failures

5.1.28. National Grid Gas PLC Feeder Main 13 Simprim/Corbridge is located in Part A area and cross the proposed route (**Ref. 22**).

5.1.29. There is no foul water drainage or water supply connection to the existing A1 within the area of Part A. However, there are existing connections to commercial, industrial and residential properties located within and close by to the area of Part A.

5.1.30. There are no high voltage overhead transmission lines and pylons within Part A which crossover or run along at the side of the carriageway.

Malicious Acts

5.1.31. Eshott Airfield, located at Felton, was previously an RAF base/airfield construction in WWII. As part of **Chapter 11: Geology and Soils, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) a desktop UXO study was highlighted the potential for unexploded ordnance from WWII within the vicinity of the airfield and Part A.

5.1.32. No acts of terrorism have been recorded within or close to the Part A area.

6. MAJOR EVENTS LONG AND SHORT LIST

6.1.1. As detailed in the Scoping Methodology **Section 2.2** above, the output from the scoping study was a Major Events Long List and Short List.

6.2. LONG LIST

6.2.1. A copy of the "Long List" of Major Event types is provided in **Appendix C**. Although some of these Major Events are already considered under other legislative or design requirements, this is not considered to be sufficient reason to automatically eliminate the major event from any further consideration.

6.2.2. In accordance with emerging EIA practice, occupational health and safety (H&S) was scoped out of this topic as it is covered by detailed H&S legislation, such as:

a. The Control of Major Accident Hazard Regulations 2015 (**Ref. 28**)
b. The Dangerous Substances and Explosive Atmospheres Regulations 2002 (**Ref. 33**)
c. The Workplace (Health, Safety and Welfare) Regulations 1992 (**Ref. 39**)
d. The Health & Safety At Work Act 1974 (**Ref. 8**), Sections (1) and (2)
e. Management of Health & Safety at Work Regulations 1999 (**Ref. 40**)

6.2.3. Other health issues are covered in relevant topic sections of air quality, noise and vibration, population and human health, and road drainage and the water environment (refer to **Technical Chapters 5 to 14**, **Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**)). As such, human health impacts are "in combination" impacts and are considered under the combined and cumulative effects detailed in **Chapter 15:Assessment of Combined Effects, Volume 2** of this ES, and **Chapter 16: Assessment of Cumulative Effects, Volume 4** of this ES (**Application Document Reference: TR010041/APP/6.4**).

6.3. SHORT LIST

6.3.1. Those Major Events that were included on the Short List of Major Events and taken forward for further assessment are included in **Table 6-1** below.

Table 6-1 - Short List of Potential Major Events

Hazard Group	Hazard Category	Event Type	Location Risk	Construction Phase Risk	Operation Phase Risk	Basis of Decision to Scope In/Out	Scope In?	Potential Receptors
Natural Hazards	Hydrology	Fluvial Flooding (overflow of rivers and burns)	Y	Y	Y	Environment Agency Flood Map for Planning (Rivers and Sea) indicates that the majority of Part A alignment is located in the low-risk Flood Zone 1, where the risk of flooding from fluvial sources is less than 1 in 1,000 (0.1%) in any year. However, Part A does include sections located in the medium risk Flood Zone 2, where the risk of fluvial flooding is between 1 in 1,000 (0.1%) and 1 in 100 (1%) in any year, and the high-risk Flood Zone 3, where there is a greater than a 1 in 100 (1%) risk of fluvial flooding in any year. The identified fluvial flood risk is associated with the following watercourses: the River Coquet, Longdike Burn (and the Poxtondean Burn that discharges into the Longdike Burn), Earsdon Burn, the River Lyne and Floodgate Burn. Therefore, at this site, fluvial flooding can directly cause damage to transport infrastructure, hastening the deterioration of materials. High levels of precipitation (i.e. in winter) not only can result in the flooding of the road infrastructure but may also damage bridge infrastructure (through increased scour and erosion of embankments) so the bridge over the River Coquet could be affected by this. Following significant flooding in Morpeth in 2008, and again in 2012, a major flood alleviation scheme was implemented involving raised flood defences and the storage of floodwater upstream. The areas of high and medium risk could represent a health and safety risk for motorists if this is not mitigated.	Y A flood risk assessment has been undertaken for Part A (refer to **Chapter 10: Road Drainage and the Water Environment**, **Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**).	Road Users Public and local community
Natural Hazards	Hydrology	Pluvial (Surface Water) Flooding	Y	Y	Y	The Northumberland County Council Level 1 Strategic Flood Risk Assessment indicates significant flooding within the North East Northumberland river catchments from pluvial and fluvial sources since 1744. A number of significant flood events are attributed to the River Coquet and have impacted settlements and roads within the Study Area. Surface water flooding is an issue in parts of Northumberland and there is a need for surface water management to reduce the risk of flooding from new development. The Highways England Drainage Data Management System (HADDMS) indicates that the Morpeth to Felton section of the existing A1 has 8 documented historical flood events of which 2 are detailed as high severity events resulting in the total closure of the carriageway. With regard to future projections, UKCP09 suggests that climate change is projected to lead to wetter winters and drier summers, with more extreme rainfall events. The UKCP09 projections for changes in extreme precipitation in winter in the Morpeth 25 km grid square under High emissions scenarios estimate that by the 2020s, precipitation on the wettest day in winter is expected to increase by approximately 7.3%, by 2050s by 15.4% and by 2080s by 25.3%.	Y A flood risk assessment has been undertaken for Part A (refer to **Chapter 10: Road Drainage and the Water Environment, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**).	Road Users Public and local community

Hazard Group	Hazard Category	Event Type	Location Risk	Construction Phase Risk	Operation Phase Risk	Basis of Decision to Scope In/Out	Scope In?	Potential Receptors
						The increase in impermeable surfaces as a result of Part A along with the likely increase in rainfall as a result of climate change over the lifetime of Part A would increase flood risk if not mitigated, in addition to, a potential pollution threat to nearby water courses.		
Natural Hazards	Climatological and Metrological	Cyclones, hurricanes, typhoons, storms and gales	Y	N	N	The winter of 2015/2016 was the second wettest winter on record and a series of storms (including 'Desmond' and 'Eva') resulted in heavy and sustained rainfall. 17,600 UK properties were flooded and several bridges collapsed, disrupting access to and from local communities. Part A crosses two main rivers (Coquet and Lyne).	Y A flood risk assessment has been undertaken for Part A (refer to **Chapter 10: Road Drainage and the Water Environment**, **Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**) which has taken into account the output of the Climate Change assessment (refer to **Chapter 14: Climate, Volume 2** of this ES).	Road Users
Natural Hazards	Biological	Animal Diseases: **Zoonotic:** Avian influenza West Nile virus Rabies **Non-Zoonotic:** Foot and mouth Swine fever	Y	Y	N	Low and highly pathogenic avian influenza has been recorded in poultry in the UK several times in the last 10 years, most recently in the winter of 2016/17, although with no human cases reported. There was a devastating foot and mouth outbreak in 2001 (**Ref.32**). Foot and mouth burial pits are within the construction area. Scoped in as construction activities are likely to take place above the animal burial pits. The use of Part A (highway) is not going to be the source of any disease epidemics and spread would be controlled through containment of infected animals including prohibition of transportation.	Y	Road users Public and local communities

Hazard Group	Hazard Category	Event Type	Location Risk	Construction Phase Risk	Operation Phase Risk	Basis of Decision to Scope In/Out	Scope In?	Potential Receptors
Technological or Manmade Hazards	Industrial and Urban Accidents	Major Accident Hazard Pipelines	N	Y	N	National Grid high pressure natural gas pipeline runs under a section of Part A and through the Part A area. Part A includes for the re-routing under the A1, including a new strengthened pipeline to meet current engineering and safety standards. However, there would be an increased risk of a major event during the construction phase due to the nature of the work required on the pipeline. Risks during maintenance and operation of Part A should be no higher than existing situation.	Y	Road users Public and local communities
Technological or Manmade Hazards	Transport accidents	Road	N	Y	N	Significant transport accidents occur across the UK on a daily basis, mainly on roads, and involving private and/or commercial vehicles. Increased traffic speeds (new maximum speed limit will be 70mph) will potentially increase the severity of Road Traffic Accidents which occur, however bus routes and stops have been designed to take into consideration the increased speed limit. During the construction phase heavy construction plant interacting with road users on the adjacent existing highway.	Y	Road users
Technological or Manmade Hazards	Industrial and Urban Accidents	Mines and storage caverns	Y	Y	Y	Coal Authority records state that there are two areas of coal workings, one at Causey Park Hag and the other adjacent to the airfield at the northern end of the Order Limits. There are nine mine entries along the route, there may be unrecorded mine entries in addition to these. Proposed bridge structures will be treated as areas where possible unrecorded workings would pose an unacceptable risk.	Y A geology and soils assessment has been undertaken for Part A (refer to **Chapter 11: Geology and Soils**, **Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**))	Road users
Technological or Manmade Hazards	Pollution accidents	Land	Y	Y	N	Use of fossil fuels and storage of lubricants and oils for mobile plant and equipment during the construction phase. Animal burial pit (foot and mouth), will be within the construction area.	Y A geology and soils assessment has been undertaken for Part A (refer to **Chapter 11: Geology and Soils, Volume 2** of this ES (**Application Document**	Local heritage Public and local community

Hazard Group	Hazard Category	Event Type	Location Risk	Construction Phase Risk	Operation Phase Risk	Basis of Decision to Scope In/Out	Scope In?	Potential Receptors
							Reference: TR010041/APP/6.2)).	
Technological or Manmade Hazards	Pollution accidents	Water	Y	Y	Y	There are a number of Secondary Aquifers, such as the Carboniferous Limestone and Millstone Grit, which are capable of supporting water supplies at a local scale, including Abbey Well in Morpeth. Given the rural nature of the County both the Principal and Secondary Aquifers support a significant number of private water supplies. It is important that these water resources are protected. Potential fuel/lubricant spillages from transportation accidents reach surface waters.	Y A road drainage and water environment assessment has been undertaken for Part A (refer to **Chapter 10: Road Drainage and the Water Environment, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**)).	Public and local community Water environment
Technological or Manmade Hazards	Utility failures	Gas	N	Y	N	No gas use associated with Part A. However, Part A requires modification to gas main running under road which could lead to local/regional loss of supply whilst construction work in progress.	Y	Public and local community
Technological or Manmade Hazards	Malicious Attacks	Unexploded Ordnance	N	Y	N	Strategic targets in the general area of Part A include Eshott Airfield (located immediately east of Part A) and public utilities and infrastructure. It is estimated that there is the potential for up to six unexploded bombs, six incendiary bombs and seven high explosive bombs to have been dropped on the Study Area between 1940 and 1941.	Y A geology and soils assessment has been undertaken for Part A which includes a UXO desk study (refer to **Chapter 11: Geology and Soils**, **Volume 2** of this ES (**Application Document**	Public and local community

Hazard Group	Hazard Category	Event Type	Location Risk	Construction Phase Risk	Operation Phase Risk	Basis of Decision to Scope In/Out	Scope In?	Potential Receptors
							Reference: TR010041/APP/6.2)).	

6.4. MITIGATION MEASURES

6.4.1. Key management and mitigation measures are described in the Risk Record (**Appendix D**). In all cases, compliance with the legal and regulatory requirements described in this section to manage risks to be ALARP must be demonstrated, including the requirement to:

a. Manage all road accident risks in accordance with road safety report
b. Comply with design standards, this will include designing to appropriate environmental parameters (flood, wind, lightning) including climate change. Design standards apply to controls and systems, civil infrastructure, gas pipeline and electrical infrastructure
c. Co-ordination between Highways England and its maintenance contractors

6.5. ASSESSMENT OF POTENTIAL MAJOR EVENTS

POTENTIAL MAJOR RISK EVENTS – CONSTRUCTION PHASE

6.5.1. The nine major events to which Part A may be vulnerable during the construction phase and the outcomes of the assessment are summarised in **Table 6-2** below and detailed in the Risk Record (**Appendix D**). Based on the assumptions and mitigation measures put forward by the Topic Specialists in their ES Chapter, it is considered that they will all be managed to be ALARP.

Table 6-2 - Construction Phase Potential Major Events

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	ES Topic	Is this As Low As Reasonably Practicable with existing mitigation?
5	Natural Hazards: Hydrology	Extreme weather (flood)	Surface water flooding.	Heavy precipitation on Part A which the drainage network cannot cope with risks due blockage, channel roughness, downstream water and exceedance events.	A review of the Environment Agency Flood Risk from Surface Water map indicates that sections of Part A are at high, medium and low risk of flooding from surface water sources The HADDMS online database indicates that the Morpeth to Felton section of the existing A1 has eight documented historical surface water flood events of which 2 are detailed as high severity events resulting in the total closure of the carriageway.	Death and / or injury to road users	**Chapter 10: Road Drainage and the Water Environment**, **Chapter 12: Population and Human Health, Chapter 11: Geology and Soils**, **Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**).	Y
9	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.	**Chapter 12: Population and Human Health, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**).	Y
13	Technological or Manmade Hazards: Major Accident Hazard Pipelines	Fire and / or explosion or release of harmful gas	Presence of underground services/utilities -sewers, gas, electricity, potable water, telecoms/data and surface/storm water drainage.	Presence of existing utilities within the Part A area which are nearby to residential and commercial properties.	Striking of underground services/utilities	Fire and/or explosion affects neighbouring property and/or members of the public.	**Chapter 12: Population and Human Health, Chapter 11: Geology & Soils**, **Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**	Y
14	Technological or Manmade Hazards: Major Accident Hazard Pipelines	Fire and / or explosion or release of harmful gas	Presence of underground cross-country gas high pressure pipeline (National Grid Gas PLC Feeder Main 13 Simprim/Corbridge).	Presence of underground cross-country gas high pressure pipeline (National Grid Gas PLC Feeder Main 13 Simprim/Corbridge near residential properties in proximity to Helm.	Striking of underground services/utilities.	Fire and/or explosion affects neighbouring property and/or members of the public.	**Chapter 12: Population and Human Health, Chapter 11: Geology and Soils, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**).	Y

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	ES Topic	Is this As Low As Reasonably Practicable with existing mitigation?
18	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.	**Chapter 12: Population and Human Health, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**).	Y
24	Technological or Manmade Hazards: Major Accident Hazard Pipelines	Major road traffic accident and large-scale gas release	Modified existing gas pipeline beneath A1	Modified pipeline shifting or collapsing	Destabilisation of A1 leading to collapse and potential gas explosion due to vehicles igniting released gas.	Death and / or injury to road users.	**Chapter 12: Population and Human Health, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**).	Y
25	Technological or Manmade Hazards: Malicious Attacks	Fire and / or explosion or release of harmful gas	Unexploded ordnance.	Presence of unexploded ordnance	During ground investigation or construction discovering UXO. Borehole drilling rigs encountering buried ordnance and force and vibration causing explosion	Fire and/or explosion affects neighbouring property and/or those people in the immediate area.	**Chapter 12: Population and Human Health, Chapter 9: Biodiversity**, **Chapter 8: Cultural Heritage, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**).	Y
41	Technological or Manmade Hazards: Transport accidents	Major road traffic accident	Existing road bridges loaded with additional construction traffic e.g. piling rigs.	Debris striking traffic / member of public	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	**Chapter 12: Population and Human Health, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**).	Y
42	Technological or Manmade Hazards: Transport 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	1) Injury to third parties. 2) Debris falling on public highway resulting in accident. 3) Damage to third party utilities / services located on or near bridges.	Death and / or injury to members of the public	**Chapter 12: Population and Human Health, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**).	Y

POTENTIAL MAJOR RISK EVENTS - OPERATIONAL AND/OR MAINTENANCE PHASES

6.5.2. The four major events to which Part A may be vulnerable during the operation and/or maintenance phase and the outcomes of the assessment are summarised in **Table 6-3** below and detailed in the Risk Record (**Appendix D**). Based on the assumptions and mitigation measures put forward by the Topic Specialists, in their ES Chapter, it is considered that they will all be managed to be ALARP.

Table 6-3 - Operation and Maintenance Phase Potential Major Events

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	ES Topic	Is this As Low As Reasonably Practicable with existing mitigation?
4	Natural Hazards: Hydrology	Collapse / damage to structures	Fluvial flooding.	Flooding of the River Coquet	Flooding leading to damage to infrastructure and deterioration of materials (e.g. scouring and erosion of embankments). The northbound abutment for the River Coquet Bridge has been the subject of an assessment during recent maintenance periods. The geomorphological map outlines the area where rotational slips have occurred within the bedrock and superficial soils. Potential slope failures in this area will be a key risk for the development of the design for this proposal	Death and / or injury to members of the public.	**Chapter 14: Climate**, **Chapter 10: Road Drainage and the Water Environment, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**).	Y
5	Natural Hazards: Hydrology	Extreme weather (flood)	Surface water flooding.	Heavy precipitation on Part A which the drainage network cannot cope with risks due blockage, channel roughness, downstream water and exceedance events.	A review of the Environment Agency Flood Risk from Surface Water map indicates that sections of Part A are at high, medium and low risk of flooding from surface water sources The HADDMS online database indicates that the Morpeth to Felton section of the existing A1 has eight documented historical surface water flood events of which 2 are detailed as high severity events resulting in the total closure of the carriageway.	Death and / or injury to road users	**Chapter 12: Population and Human Health,** **Chapter 11: Geology and Soils,** **Chapter 10: Road Drainage and the Water Environment**, **Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**).	Y

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	ES Topic	Is this As Low As Reasonably Practicable with existing mitigation?
10	Technological or Manmade Hazards: Industrial and Urban Accidents	Collapse / damage to structures	Presence of unrecorded mine workings. The entire route corridor has been assessed to have moderate risk associated with the presence of shallow 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.	**Chapter 12: Population and Human Health, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**).	Y
24	Technological or Manmade Hazards: Industrial and Urban Accidents	Major road traffic accident and large scale gas release	Modified existing gas pipeline beneath A1	Modified pipeline shifting or collapsing	Destabilisation of A1 leading to collapse and potential gas explosion due to vehicles igniting released gas.	Death and / or injury to road users.	**Chapter 12: Population and Human Health, Volume 2** of this ES (**Application Document Reference: TR010041/APP/6.2**).	Y

7. GLOSSARY

7.1.1. The definition of key terms used in this Report are defined below. These definitions have been developed by reference to the definitions used in EU and UK legislation and guidance relevant to major accidents and/or disasters as well as professional judgement in the context of Part A (**Ref. 41, 42, 27, 28, 29, 30, 25, 31, 43, 44, 45**).

Table 7-1 - Key Terms and Definitions Relevant to this Report

Term	Definition
Disaster	In the context of Part A, a naturally occurring phenomenon such as an extreme weather event (for example storm, flood, temperature) or ground-related hazard events (for example subsidence, landslide, earthquake) with the potential to cause an event or situation that meets the definition of a Major Accident as defined above.
External Influencing Factor	A factor which occurs beyond the Order Limits that may present a risk to Part A, e.g. if an external disaster occurred (e.g. earthquake, COMAH site major accident) it would increase the risk of serious damage to an environmental receptor associated with Part A
Hazard	Anything with the potential to cause harm, including ill-health and injury, damage to property or the environment; or a combination of these
Internal Influencing Factor	A factor which occurs within the Order Limits that may present a risk to Part A.
Major Accident	In the context of Part A, an event that threatens immediate or delayed serious damage to human health, welfare and/or the environment and requires the use of resources beyond those of The Applicant or its contractors to respond to the event. Serious damage includes the loss of life or permanent injury and/or permanent or long-lasting damage to an environmental receptor that cannot be restored through minor clean-up and restoration efforts. The significance of this effect will take into account the extent, severity and duration of harm and the sensitivity of the receptor.
Major Accident Hazard Pipeline	A pipeline in which a dangerous fluid within the scope of the Pipelines Safety Regulations 2006 (**Ref. 35**) is being or is to be conveyed.

Term	Definition
Major Event	Combined term used for a Major Accident and/or Disaster (as defined in this table).
Risk	The likelihood of an impact occurring combined with effect or consequence(s) of the impact on a receptor if it does occur.
Risk Event	An identified, unplanned event, which is considered relevant to Part A and has the potential to be a Major Accident and/or Disaster subject to assessment of its potential to result in a significant adverse effect on an environmental receptor.
Vulnerability	In the context of the 2014 EU Directive, the term refers to the 'exposure and resilience' of Part A to the risk of a major accident and/or disaster. Vulnerability is influenced by sensitivity, adaptive capacity and magnitude of impact.

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33. The Dangerous Substances and Explosive Atmospheres Regulations 2002 (SI 2002 No. 2776) (DSEAR)
34. Pipe-Lines Act 1962 (c. 58)
35. The Pipelines Safety Regulations 1996 (SI 1996 No. 825)
36. Gas Safety (Management) Regulations 1996 (as amended) (SI 1996 No. 551)
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38. The Coal Authority (2018), letter Ref:TR10041-000003 dated 21/2/2018.
39. The Workplace (Health, Safety and Welfare) Regulations 1992 (SI 1992 No. 3004)
40. Management of Health & Safety at Work Regulations 1999 (SI 1999 No. 3242)
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Appendix A

COMPETENT EXPERT EVIDENCE

Major Accidents and Disasters Assessment Professional Competence

Name	Role	Qualifications and Professional Memberships	Experience
Colin Chambers	Reviewer	- MSc Occupational and Environmental Health and Safety Management - BSc (Hons) Chemical Engineering - European Engineer - Chartered Engineer - Chartered Environmentalist - Chartered Scientist - Fellow of the Institute of Chemical Engineers - Member of the Society for the Environment, - Practitioner of Institute of Environmental Management and Assessors - Graduate Member of Institute of Occupational Safety & Health	35 years of experience in the identification, assessment of major accident hazards; preparation of safety reports for Major Accident Hazard sites and emergency preparedness and response. Relevant transport projects: - HS2 Phase 2b major accidents and disasters assessment. - Highways England, A1 Morpeth to Felton major accidents and disasters scoping and assessment. - Highways England, A27 Arundel Bypass major accidents and disasters scoping.
Laura Dugdale	Author	- MSc Environmental Management - BSc (Hons) Environmental Science - Chartered Environmentalist - Member of the Society for the Environment	16 years of experience in the identification, assessment of major accident hazards and preparation of safety reports for Major Accident Hazard sites. Relevant transport projects: - HS2 Phase 2b major accidents and disasters assessment. - Highways England, A1 Morpeth to Felton major

Name	Role	Qualifications and Professional Memberships	Experience
		- Full member of the Institute of Environmental Management and Assessment - Technical member of the Institute of Occupational Safety & Health	accidents and disasters scoping and assessment. - Highways England, A27 Arundel Bypass major accidents and disasters scoping.

Appendix B

LEGISLATION AND GUIDANCE SUMMARY

LEGISLATION AND GUIDANCE SUMMARY

LEGISLATION

Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (SI 2017 No. 572)

The objective of these Regulations is to provide a high level of protection of the environment and to help integrate environmental considerations into the preparation of proposals for development to reduce their impact on the environment. The Regulations prohibit the granting of consent for development which is likely to have a significant effect on the environment unless an EIA has been carried out.

The Regulations require:

a. The assessment of the expected significant adverse effects of the proposed scheme on the environment arising from the vulnerability of the proposed scheme to risks of major accidents or disasters that are relevant to the project concerned.
b. A description of the measures envisaged to prevent or mitigate the significant adverse effects of major accidents and/or disasters on the environment and details of the preparedness for and proposed response to such emergencies.

Health and Safety at Work etc. Act 1974 (c. 37)

The Act provides the framework for the regulation of workplace health and safety in the UK. It places general duties on employers, people in control of premises, manufacturers and employees. The overriding principle is that foreseeable risks to persons will be reduced so far as is reasonably practicable and that adequate evidence will be produced to demonstrate that this has been done.

The Act provides a legal framework for the provision of safe plant and equipment and prevention of harm to people from occupational hazards present in a workplace, including emergencies which may affect those offsite, or visiting the site.

Construction (Design and Management) Regulations 2015 (SI 2015 No. 51)

These regulations place legal duties on almost all parties involved in construction work. The regulations place specific duties on clients, designers and contractors, so that health and safety is taken into account throughout the life of a construction project from its inception to its subsequent final demolition and removal. Under the CDM Regulations, designers must avoid foreseeable risks so far as is reasonably practicable by: eliminating hazards from the construction, cleaning, maintenance, and proposed use and demolition of a structure, reducing risks from any remaining hazard, and giving collective safety measures priority over individual measures.

The Client, Designers and Contractors must avoid foreseeable risks so far as is reasonably practicable by: eliminating hazards associated with the design, construction, operation and maintenance aspects of Part A. Therefore, the regulations ensure that mechanisms are in place to continually identify, evaluate and manage safety risks throughout the design, construction and operation phases of Part A. Many of the risks identified and managed out at the design phase also serve to eliminate or reduce the risk of a major accident (and

therefore environmental consequence) occurring during the construction, operational and maintenance phases.

Control of Major Accident Hazards Regulations 2015 (SI 2015 No. 483)

The purpose of the COMAH Regulations is to prevent major accidents involving dangerous substances and limit the consequences to people and the environment of any accidents which do occur.

The COMAH Regulations 2015 implement the majority of the Seveso III Directive (2012/18/EU) in Great Britain. There are a number of COMAH sites close to Part A whose risk profile could be impacted by Part A and/or Part A falling within the Public Information Zone (PIZ) of a site.

Any areas of Part A which fall within the PIZ of a COMAH site will need to ensure the onward communication of emergency information relating the Major Accident Hazard to relevant person, this will be particularly relevant during the construction phase when the transient workforce may spend significant time within a designated COMAH zone.

Health and Safety at Work etc. Act 1974 (c. 37)

The Act sets down the core principles for managing H&S and goal setting duties for employers, employees, the self-employed and those controlling workplaces; including:

a. Securing the health, safety, and welfare of persons at work
b. Protecting persons other than persons at work against risks to health or safety arising out of or in connection with the activities of persons at work
c. Controlling the keeping and use of explosive or highly flammable or otherwise dangerous substances, and generally preventing the unlawful acquisition, possession and use of such substances

Highways England, contractors and sub-contractors have to avoid foreseeable risks so far as is reasonably practicable by: eliminating hazards associated with all work-related activities associated with Part A throughout its lifecycle both to their employees and others arising out of or in connection with the activities of persons at work.

This is particularly relevant during the construction and maintenance phases.

Management of Health and Safety at Work Regulations 1999 (SI 1999 No. 3242)

The Regulations reinforce employer's duties to manage health and safety and apply to all work activities. The principal of risk based assessment provides the cornerstone for management of H&S and all employers are required to undertake risk assessments. The regulations require the assessment and management of H&S risks and where required procedures for dealing with emergencies, which would include major accidents.

Many of the risks identified and managed will serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the construction, operational and maintenance phases of Part A.

Occupier's Liability Act 1984 (c.3)

This Act amends the law of England and Wales as to the liability of persons as occupiers of premises for injury suffered by persons other than their visitors.

Provides a legal framework for the prevention of harm to people from occupational safety and health hazards present on premises under the control of the Occupier, including to those visiting the premises.

Part A includes areas of land designated for marshalling of construction resources which attract visitors who could be impacted by Major Events whilst on/crossing those Highways England controlled premises.

The Planning (Hazardous Substances) Regulations 2015 (SI 2015 No. 627)

These regulations transpose the land-use planning requirements of the European Seveso III Directive and relate to the way hazardous substances consents operate, and the way in which the planning system reduces the likelihood and impact of major accidents.

Hazardous Substance Consents (HSC) focus on ensuring the safety of the public around the consented site from potential major accident hazards.

Part A might be impacted by a Major Accident at a HSC site and/or increase the risk profile of the HSC site.

Pipe-Lines Act 1962 (c. 58)

The purpose of the Act is to ensure the orderly construction of pipelines in such a way as to meet the requirements of the pipeline users, while at the same time minimising disturbance to farmers and land owners by careful planning of routes and by avoiding unnecessary duplication of pipelines. The provisions of the Act are substantially directed towards industrial pipelines except where these are already covered by existing legislation. Pipelines are divided in to two categories: local pipelines, which are those pipelines not exceeding 10 miles in length, and cross-country pipelines, which are those which do exceed 10 miles in length. Section 7(1) of the 1962 Act provides that the construction of a pipeline not exceeding 10 miles in length as an addition to another pipeline is to be deemed to be the construction of a cross country pipeline (and not of a local pipeline) if the length of the two exceeds 10 miles. The Act provides that cross country pipelines may not be constructed without authorisation of the Secretary of State.

The Act requires minimising disturbance to other buried utility providers and land/property owners by careful planning of routes for the Gas Pipeline in Part A.

The Pipelines Safety Regulations 1996 (SI 1996 No. 825)

The purpose of these Regulations is to ensure that pipelines are designed, constructed and operated properly to ensure their integrity and reduce environmental risks.

The Regulations require the preparation of a Safety Report which demonstrates that the risks associated with the Gas Pipeline passing under Part A and which is to be modified are ALARP and prevent/minimise a potential major accident prior to construction and operation.

Many of the risks identified and managed out at the design, pre-construction phases also serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the construction, operational and maintenance phases of Part A.

Gas Safety (Management) Regulations 1996 (as amended) (SI 1996 No. 551)

These Regulations provide for the preparation and acceptance of safety cases in respect of the conveyance of gas in a network and impose requirements in respect of gas escapes and the composition and pressure of gas.

The Regulations require the preparation of a Safety Report which demonstrates that the risks associated with the Gas Pipeline passing under Part A and which is to be modified are ALARP and prevent/minimise a potential major accident prior to construction and operation.

Many of the risks identified and managed out at the design, pre-construction phases also serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the construction, operational and maintenance phases of Part A.

GUIDANCE

Defra (2011) 'Green Leaves III' Guidelines for Environmental Risk Assessment and Management

These guidelines provide generic guidance for the assessment and management of environmental risks. A cyclical framework for risk management is provided which identifies four main components of risk assessment:

1. Formulating the problem;
2. Carrying out an assessment of the risk;
3. Identifying and appraising the management options available; and
4. Addressing the risk with a risk management strategy.

A source-pathway-receptor model is suggested as a tool to assist in risk screening and an example is provided of applying the following filters to prioritise significant hazards for further investigation:

a. The plausibility of linkages between the source of a hazard and a receptor;
b. The relative potency of a hazard, availability of a pathway, or vulnerability of a receptor;
c. The likelihood of an event, on the basis of historic occurrence or of changed circumstances; or
d. A view on the performance of current risk management measures that, if they were to fail, may increase the potential for future harm.

Chemical and Downstream Oil Industries Forum, (2013), Guideline – Environmental Risk Tolerability for COMAH Establishments

These guidelines provide a common screening methodology for carrying out an environmental risk assessment under the COMAH Regulations. Amongst other things, the guidance:

a. defines the types of harm that should be considered in an environmental risk assessment, and how the harm should be characterised for the assessment;
b. defines the risk criteria to be used in assessing tolerability of the environmental risk from an establishment, and where appropriate, individual scenarios; and
c. explains how risks may be evaluated.

The guidelines present a series of thresholds that can be used to 'screen' the potential for a Major Accident to the Environment (MATTE) to relevant environmental receptors. The thresholds have been developed based on the criteria for reporting a major accident to the European Commission defined in the Seveso III Directive and COMAH Regulations, and to guidance on MATTE issued by the then Department of the Environment, Transport and the Regions in 1999. The thresholds are presented in two dimensions, namely (i) extent and severity and (ii) duration of harm; and thresholds for both dimensions must be exceeded for the scenario to be considered a potential MATTE.

The International Standards Organization's ISO 31000: 2009 Risk Management – Principles and Guidelines

This guideline identifies a number of principles that need to be satisfied to make risk management effective. If the standards are adopted and applied the management of any risk should help minimise losses, improve resilience, improve controls and improve the identification of opportunities and threats.

The ISO standard states that when defining risk criteria, the following factors should be considered:

a. the nature and types of causes and consequences that can occur and how they will be measured
b. how likelihood will be defined
c. the timeframe(s) of the likelihood and/or consequence(s)
d. how the level of risk is to be determined
e. the views of stakeholders
f. the level at which risk becomes acceptable or tolerable
g. whether combinations of multiple risks should be taken into account and, if so, how and which combinations should be considered

Appendix C

SCOPING LONG LIST

Hazard Group	Hazard Category	Event Type	Location Risk	Construction	Operation	Basis of Decision to Scope In/Out	Scope in?	Potential Receptors
Natural Hazards	Geophysical	Earthquakes	N	N	N	Do not occur in Britain of a sufficient intensity owing to the motion of the Earth's tectonic plates causing regional compression. In addition, uplift from the melting of the ice sheets that covered many parts of Britain thousands of years ago can also cause movement. The BGS acknowledges that on average, a magnitude 4 earthquake happens in Britain roughly every two years and a magnitude 5 earthquake occurs around every 10 to 20 years. As such the Cabinet Office National Risk Register of Civil Emergencies (**Ref.32**) states that "Earthquakes in the UK are moderately frequent but rarely result in large amounts of damage. An earthquake of sufficient intensity (determined on the basis of the earthquake's local effect on people and the environment) to inflict severe damage is unlikely". In terms of geographical proximity, the closest epicentre of an earthquake to Part A occurred in 1983, approximately 1.8 km to the west at Pigdon with a magnitude of 1.8 on the Richter scale and in 2002 approximately 11.4 km west at Broomfield Fell with a magnitude of 1.1 on the Richter scale (**Ref. 13**). As earthquakes have not caused any deaths in the UK since 1950, and buildings are damaged (not devastated) this disaster is scoped out.	N	N/A
Natural Hazards	Geophysical	Volcanic Activity	N	N	N	Volcanic activity does not occur in the UK and is not linked to Part A.	N	N/A
Natural Hazards	Geophysical	Landslides	N	N	N	No historical landslides have been recorded within the boundary of Part A (**Ref.13**).	N	N/A
Natural Hazards	Geophysical	Sinkholes	N	N	N	This is likely to be covered in the geotechnical design, and there are no examples of roads that have been affected by sinkholes in the locality to warrant taking this event forward.	N	N/A
Natural Hazards	Geophysical	Tsunamis	N	N	N	Part A is located inland, outside a tsunamis risk zone (**Ref.14**).	N	N/A
Natural Hazards	Hydrology	Coastal Flooding	N	N	N	Part A is located inland, outside a coastal area.	N	N/A
Natural Hazards	Hydrology	Fluvial Flooding (overflow of rivers and burns)	Y	Y	Y	Environment Agency Flood Map for Planning (Rivers and Sea) indicates that the majority of the Part A alignment is located in the low-risk Flood Zone 1 where the risk of flooding from fluvial sources is less than 1 in 1,000 (0.1%) in any year. However, Part A does include sections located in the medium risk Flood Zone 2, where the risk of fluvial flooding is between 1 in 1,000 (0.1%) and 1 in 100 (1%) in any year, and the high-risk Flood Zone 3, where there is a greater than a 1 in 100 (1%) risk of fluvial flooding in any year. The identified fluvial flood risk is associated with the following watercourses: The River Coquet, Longdike Burn (and the Poxtondean Burn that discharges into the Longdike Burn), Earsdon Burn, the River Lyne and Floodgate Burn. Therefore, at this site, fluvial flooding can directly cause damage to transport infrastructure, hastening the deterioration of materials. High levels of precipitation (i.e. in winter) not only can result in the flooding of the road infrastructure but may also damage bridge infrastructure (through increased scour and erosion of embankments) so the bridge over the River Coquet could be affected by this.	Y	Road Users Public and local community

Hazard Group	Hazard Category	Event Type	Location Risk	Construction	Operation	Basis of Decision to Scope In/Out	Scope in?	Potential Receptors
						Following significant flooding in Morpeth in 2008, and again in 2012, a major flood alleviation scheme was implemented, involving raised flood defences and the storage of floodwater upstream **(Ref. 22)**. The areas of high and medium risk could represent a health and safety risk for motorists if this is not mitigated.		
Natural Hazards	Hydrology	Pluvial (Surface Water) Flooding	Y	Y	Y	The Northumberland County Council Level 1 Strategic Flood Risk Assessment indicates significant flooding within the North East Northumberland river catchments from pluvial and fluvial, sources since 1744. A number of significant flood events are attributed to the River Coquet and have impacted settlements and roads within the Study Area (**Ref. 22**). Surface water flooding is an issue in parts of Northumberland and there is a need for surface water management to reduce the risk of flooding from new development.(**Ref. 21**) The Highways England Drainage Data Management System (HADDMS) indicates that the Morpeth to Felton. section of the existing A1 has 8 documented historical flood events of which 2 are detailed as high severity events resulting in the total closure of the carriageway. With regard to future projections, UKCP09 suggests that climate change is projected to lead to wetter winters and drier summers, with more extreme rainfall events. The UKCP09 projections for changes in extreme precipitation in winter in the Morpeth 25 km grid square under High emissions scenarios estimates that by the 2020s, precipitation on the wettest day in winter is expected to increase by approximately 7.3%, by 2050s by 15.4% and by 2080s by 25.3%. The increase in impermeable surfaces as a result of Part A along with the likely increase in rainfall as a result of climate change over the lifetime of Part A would increase flood risk if not mitigated in addition to a potential pollution threat to nearby watercourses.	Y	Road Users Public and local community
Natural Hazards	Hydrology	Groundwater Flooding	N	N	N	A desktop study of Part A indicated that there is a low probability of significant groundwater emergence within the catchment of Part A and as such the groundwater flood risk is considered to be low.	N	N/A
Natural Hazards	Hydrology	Avalanches	N	N	N	Part A's topography is relatively flat and therefore an avalanche will not occur.	N	N/A
Natural Hazards	Climatological and Metrological	Cyclones, hurricanes, typhoons, storms and gales	Y	N	N	The winter of 2015/2016 was the second wettest winter on record and a series of storms (including 'Desmond' and 'Eva') resulted in heavy and sustained rainfall. 17,600 UK properties were flooded and several bridges collapsed, disrupting access to and from local communities. Part A crosses two main rivers (Coquet and Lyne).	Y	Road Users
Natural Hazards	Climatological and Metrological	Wave surges	N	N	N	Part A is located sufficiently inland, and therefore is not subject to wave surges.	N	N/A

Hazard Group	Hazard Category	Event Type	Location Risk	Construction	Operation	Basis of Decision to Scope In/Out	Scope in?	Potential Receptors
Natural Hazards	Climatological and Metrological	Extreme temperatures: Heatwaves Low (sub-zero) temperatures and heavy snow	N	N	N	In August 1990, the UK experienced heatwave conditions with temperatures reaching what was then a record 37.1°C in Cheltenham, England. In August 2003 a UK heatwave lasted 10 days and resulted in over 2,000 deaths. Temperatures reached what was then a record 38.5°C in Faversham, England and 33°C in Anglesey, Wales. High temperature records are now being broken with increasing frequency. The most widespread and prolonged low temperatures and heavy snow in recent years occurred from December 2009 to January 2010. Daytime temperatures were mostly sub-zero across the UK. At night, temperatures in England regularly fell to -5°C to -10°C. Snowfall across the UK lasted for some time, allowing 20 cm to 30 cm of snow to build up, closing schools and making it very difficult to travel (**Ref.32**). Between 1981 and 2010, there were 7 occurrences where summer mean temperatures exceeded 22.3°C on five or more consecutive days. Between 1981 and 2010, there have been 1,489 days with a maximum minimum temperature below zero degrees Celsius. Between 1981 and 2010, there were 467 days with snow lying at 0900 however, there are no records from the Met Office of the depth of snow. Between 1981 and 2010, there were 7 occurrences where summer mean temperatures exceeded 22.3°C on five or more consecutive days. Between 1981 and 2010, there have been 1,489 days with a maximum minimum temperature below zero degrees Celsius. Between 1981 and 2010, there were 467 days with snow lying at 0900 however, there are no records from the Met Office of the depth of snow. However, the risk is no greater than the existing section of the A1.	N	N/A
Natural Hazards	Climatological and Metrological	Droughts	N	N	N	Over the past 40 years or so England has experienced five long-duration droughts and two shorter periods of drought. During the 2010-12 drought, parts of eastern England recorded their lowest 18 month rainfall total in over 100 years. (**Ref. 32**). Potable water for the area of Part A is supplied from an abstraction on the River Coquet, an impounding reservoir and treatment works and from rural springs and treatment works. These are linked to the Tyne system with a potable water main. There are also a number of Secondary Aquifers, such as the Carboniferous Limestone and Millstone Grit, which are capable of supporting water supplies at a local scale, including Abbey Well in Morpeth. Given the rural nature of the County both the Principal and Secondary Aquifers support a significant number of private water supplies. It is important that these water resources are protected. The River Coquet has been identified as experiencing some water resource availability issues (**Ref. 21**). Prolonged periods of drought can also impact road infrastructure as drying out and cracking of soils may affect structural stability and prolonged dry periods can lead to cracking of surfaces and more rapid deterioration of materials. Decreased rainfall combined with an increase in the average temperature can also increase subsidence, affecting the stability of the road	N	N/A

Hazard Group	Hazard Category	Event Type	Location Risk	Construction	Operation	Basis of Decision to Scope In/Out	Scope in?	Potential Receptors
						infrastructure, including pavements and hard surfaces. Part A should not be vulnerable to drought as water is not an essential service during the construction, use or maintenance phases. The design of the sub-structure and bridges will be resilient to ground shrinkage and should remain in the design risk register until designed out.		
Natural Hazards	Climatological and Metrological	Severe Space Weather: Solar Flares	N	N	N	Solar flares can cause radio blackouts. Records from solar storms in 1921 and 1960 describe widespread radio disruption and impacts on railway signalling and switching systems (**Ref. 32**). There no increased reliance on roadside technology therefore Part A is no more vulnerable than the existing route.	N	N/A
Natural Hazards	Climatological and Metrological	Severe Space Weather: Solar Energetic Particles	N	N	N	Solar energetic particles which cause solar radiation storms, but only in outer space, so this major event type can be scoped out.	N	N/A
Natural Hazards	Climatological and Metrological	Severe Space Weather: Coronal Mass Ejections	N	N	N	Coronal mass ejections (CME) cause geomagnetic storms. The geomagnetic storm in 2003 caused the UK aviation sector to lose some GPS functions for a day, however no known significant impact on road users or infrastructure.	N	N/A
Natural Hazards	Climatological and Metrological	Fog	N	N	N	Fog is one of the most common weather conditions in the UK, particularly throughout autumn and winter. Severe disruption to transport occurs when the visibility falls below 50 m over a wide area. However, the risk for Part A should be no higher than the current A1 route. Collision data over the period 2010-2015 showed there to be no accidents where fog was a contributory factor.	N	N/A
Natural Hazards	Climatological and Metrological	Wildfires: Forest fire, Bush/brush, pasture	N	N	N	In April and May 2011 numerous wildfires broke out across the UK after unusually hot and dry weather. England received only 21% of its usual rainfall for April 2011. Wildfires affected (amongst other areas) West Yorkshire (**Ref. 32**). However, Part A and surrounding area does not contain vegetation with a potential high fuel load such as gorse.	N	N/A
Natural Hazards	Climatological and Metrological	Poor Air Quality	N	N	N	In 2006 the UK experienced two periods of extended hot weather with associated elevated ozone and harmful airborne particles. In the spring of 2015, two particle pollution episodes caused widespread poor air quality throughout the UK, with multiple areas measuring 'High' on the Daily Air Quality Index and resulted in around 1,100 deaths due to exacerbation of pre-existing ill-health conditions. Summer 2015 also contained two elevated ozone episodes. Construction: Construction effects would be temporary for the duration of the construction phase. Increased dust emissions from construction activities and traffic could lead to potential loss of amenity at sensitive receptors. Traffic management measures may result in both positive and adverse changes to emissions from vehicle exhausts and roadside pollution concentrations. Operation: Part A is expected to result in both positive and adverse changes to emissions of oxides of nitrogen (NOX) and nitrogen dioxide (NO2) due to changes in exhaust emissions from	N	N/A

Hazard Group	Hazard Category	Event Type	Location Risk	Construction	Operation	Basis of Decision to Scope In/Out	Scope in?	Potential Receptors
						road traffic along the A1 and linked roads. Although an increase in pollutants are anticipated along the offline section of Part A, with background concentrations well below the objective, the increase is unlikely to exceed the objective. Increased exhaust emissions could also generate a potential long-term increase in nitrogen deposition on nearby sensitive designated ecological sites, such as the River Coquet SSSI, as a result of increased traffic flows. Part A is expected to result in a decrease in pollutants as traffic moves away from the de-trunked' sections of Part A. Following implementation of appropriate mitigation measures, no significant residual air quality effects are anticipated during construction and operation of Part A.		
Natural Hazards	Biological	Disease epidemics: - Viral - Bacterial - Parasitic - Fungal - Prion	N	N	N	Part A is located in a developed country where the population is in general good health. Furthermore, the use of Part A (highway) is not going to give rise to any disease epidemics. Public Health England, the executive agency of the Department of Health is responsible for protecting the nation from public health hazards, preparing for and responding to public health emergencies. One of Public Health England's functions is to protect the public from infectious disease outbreaks and the Agency has produced a document providing operational guidance for the management of outbreaks of communicable disease, 'Communicable Disease Outbreak management: Operational Guidance'.	N	N/A
Natural Hazards	Biological	Animal Diseases: - zoonotic: • avian influenza • West Nile virus • Rabies - non-zoonotic: • foot and mouth • swine fever	Y	Y	N	Low and highly pathogenic avian influenza has been recorded in poultry in the UK several times in the last 10 years, most recently in the winter of 2016/17, although with no human cases reported. There was a devastating foot and mouth outbreak in 2001 (**Ref. 32**). Foot and mouth burial pits – 70 m west. Scoped in as construction activities are likely to take place above the animal burial pits. The use of Part A (highway) is not going to be the source of any disease epidemics and spread would be controlled through containment of infected animals including prohibition of transportation.	Y	Road users Public and local communities
Technological or Manmade Hazards	Societal	Extensive violence and loss of life.	N	N	N	Part A is located in a developed country that has steady, yet small population growth. England is politically stable with no direct border with countries experiencing conflicts.	N	N/A
Technological or Manmade Hazards	Societal	Widespread damage to societies and economies.	N	N	N	Part A is located in a developed country that has steady, yet small population growth. England is politically stable with no direct border with countries experiencing conflicts.	N	N/A
Technological or Manmade Hazards	Societal	The need for large-scale multi-faceted	N	N	N	Part A is located in a developed country that has steady, yet small population growth. England is politically stable with no direct border with countries experiencing conflicts.	N	N/A

Hazard Group	Hazard Category	Event Type	Location Risk	Construction	Operation	Basis of Decision to Scope In/Out	Scope in?	Potential Receptors
		humanitarian assistance.						
Technological or Manmade Hazards	Societal	The hindrance or prevention of humanitarian assistance by political and military constraints.	N	N	N	Part A is located in a developed country that has steady, yet small population growth. England is politically stable with no direct border with countries experiencing conflicts.	N	N/A
Technological or Manmade Hazards	Societal	Significant security risks for humanitarian relief workers in some areas.	N	N	N	Part A is located in a developed country that has steady, yet small population growth. England is politically stable with no direct border with countries experiencing conflicts.	N	N/A
Technological or Manmade Hazards	Societal	Famine	N	N	N	Part A is located in a developed country that produces its own crops and imports food. It is politically stable and not subject to hyperinflation and therefore food is available, whether produced within the UK or imported. Famine is also not relevant to the use of Part A (highway).	N	N/A
Technological or Manmade Hazards	Societal	Displaced population	N	N	N	Part A does not involve displacement of persons.	N	N/A
Technological or Manmade Hazards	Industrial and Urban Accidents	Major Accident Hazard Chemical sites	N	N	N	There are no Control of Major Accident Hazard (COMAH) sites within a 5 km corridor along Part A.	N	N/A
Technological or Manmade Hazards	Industrial and Urban Accidents	Major Accident Hazard Pipelines	N	Y	N	National Grid high pressure natural gas pipeline runs under a section of Part A and through the Part A area. Part A includes for the re-routing under the A1, including a new strengthened pipeline to meet current engineering and safety standards. However, there will be an increased risk of a major event during the construction phase due to the nature of the work required on the pipeline. Risks during maintenance and operation of Part A should be no higher than existing situation.	Y	Road users Public and local communities
Technological or Manmade Hazards	Industrial and Urban Accidents	Nuclear	N	N	N	Nuclear sites are designed, built and operated so that the chance of accidental releases of radiological material in the UK is extremely low. Last historical major accident in the UK was	N	N/A

Hazard Group	Hazard Category	Event Type	Location Risk	Construction	Operation	Basis of Decision to Scope In/Out	Scope in?	Potential Receptors
						Windscale in 1957 (**Ref. 32**). No nuclear sites within a 5 km corridor along Part A.		
Technological or Manmade Hazards	Industrial and Urban Accidents	Fuel storage	N	N	N	In December 2005, Europe's largest peacetime fire occurred at the Buncefield Oil Storage Terminal in Hemel Hempstead, England. The surrounding area was temporarily evacuated and some local businesses experienced long-term disruption to operations (**Ref. 32**). No fuel storage sites within 5 km corridor along Part A. There is a petrol station located within 150 m of Part A and a working airfield with fuel storage located within 100 m of Part A.	N	N/A
Technological or Manmade Hazards	Industrial and Urban Accidents	Dam breaches	N	N	N	Dam breaches in the UK are rare; the last major breach was at the Cwm Eigiau dam in 1925, which caused 17 fatalities and widespread flooding (**Ref. 32**). Environment Agency Flood Risk from Reservoirs map indicates that the River Coquet is located at the downstream extent of the area identified to be at risk of flooding from the potential failure of Rayburn Lake located approximately 9.3 km to the south-west of where the existing A1 crosses the River Coquet.	N	N/A
Technological or Manmade Hazards	Industrial and Urban Accidents	Mines and storage caverns	Y	Y	Y	Coal Authority records state that there are two areas of coal workings, one at Causey Park and the other adjacent to the airfield at the northern end of the Order Limits. There are nine mine entries along the route, there may be unrecorded mine entries in addition to these. Proposed bridge structures will be treated as areas where possible unrecorded workings would pose an unacceptable risk.	Y	Road users
Technological or Manmade Hazards	Industrial and Urban Accidents	Fires	N	N	N	There is a working airfield with fuel storage located 100 m east of Part A south of Felton and also a petrol station within approximately 125 m of Part A, north west of Morpeth. The risks for Part A should be no greater than the current situation	N	N/A
Technological or Manmade Hazards	Transport accidents	Road	N	Y	N	Significant transport accidents occur across the UK on a daily basis, mainly on roads, and involving private and/or commercial vehicles. Increased traffic speeds (new maximum speed limit will be 70 mph) will potentially increase the severity of Road Traffic Accidents which occur, however bus routes and stops have been designed to take into consideration the increased speed limit. During the construction phase heavy construction plant interacting with road users on the adjacent existing highway.	Y	Road users
Technological or Manmade Hazards	Transport accidents	Rail	N	N	N	No railways within the Part A area.	N	N/A
Technological or Manmade Hazards	Transport accidents	Waterways	N	N	N	No historical evidence of waterway accidents impacting the road network.	N	N/A

Hazard Group	Hazard Category	Event Type	Location Risk	Construction	Operation	Basis of Decision to Scope In/Out	Scope in?	Potential Receptors
Technological or Manmade Hazards	Transport accidents	Aviation	N	N	N	There have been no major air accidents in the UK since the Kegworth incident in 1989 (**Ref. 32**). There is a working airfield, Eshott, located 100 m east of Part A south of Felton. However, the risks associated with Part A should be no greater than the current situation.	N	N/A
Technological or Manmade Hazards	Pollution accidents	Air	N	N	N	Use of fossil fuelled mobile plant and equipment during the construction phase. However, emissions from mobile plant and equipment covered under H&S and environmental legislation.	N	N/A
Technological or Manmade Hazards	Pollution accidents	Land	N	Y	N	Use of fossil fuels and storage of lubricants and oils for mobile plant and equipment during the construction phase.	Y	Local heritage Public and local community
Technological or Manmade Hazards	Pollution accidents	Water	Y	Y	Y	There are a number of Secondary Aquifers, such as the Carboniferous Limestone and Millstone Grit, which are capable of supporting water supplies at a local scale, including Abbey Well in Morpeth. Given the rural nature of the County both the Principal and Secondary Aquifers support a significant number of private water supplies. It is important that these water resources are protected (**Ref. 21**). Potential fuel/lubricant spillages from transportation accidents reach surface waters.	Y	Public and local community Water environment
Technological or Manmade Hazards	Utilities failures	Electricity	N	N	N	Instances of electricity failure (also referred to as power loss or blackout) can be caused by a number of things, such as severe weather (e.g. very strong winds, lightning and flooding) which damage the distribution network. These tend of be mainly specific place, local (e.g. metropolitan area) and less frequently regional (e.g. North East) as a result of severe winter storms and consequent damage to the distribution overhead line network. Overhead distribution powerlines cross and/or run close to the A1.	N	N/A
Technological or Manmade Hazards	Utilities failures	Gas	N	Y	N	No gas use associated with Part A so not significant on Part A. However, work on construction of Part A could result in regional/local loss of gas supply.	Y	Local community
Technological or Manmade Hazards	Utilities failures	Water supply	N	N	N	The Kielder Water Resource Zone (WRZ) serves the vast majority of Northumberland. Most development coming forward in this zone would be capable of being supplied without problem, although, within the area, the rivers Coquet and Font have been identified as experiencing some water resource availability issues. No water use associated with Part A during its operation and relatively low use during construction which could be addressed by tankering in supplies if required.	N	N/A
Technological or Manmade Hazards	Utilities failures	Sewage system	N	N	N	No use of the sewage system associated with Part A. During construction phase temporary portable systems will be in place covered by H&S welfare requirements.	N	N/A
Technological or Manmade Hazards	Malicious Attacks	Unexploded Ordnance	Y	Y	N	Strategic targets in the general area of Part A include Eshott Airfield (located immediately east of Part A) and public utilities and infrastructure. It is estimated that there is the potential for up to six	Y	Public and local community

Hazard Group	Hazard Category	Event Type	Location Risk	Construction	Operation	Basis of Decision to Scope In/Out	Scope in?	Potential Receptors
						unexploded bombs, six incendiary bombs and seven high explosive bombs to have been dropped on the Study Area between 1940 and 1941.		
Technological or Manmade Hazards	Malicious Attacks	Attacks Chemical Biological Radiological Nuclear	N	N	N	Extremists remain interested in Chemical, Biological, Radiological and Nuclear (CBRN) materials, however alternative methods of attack such as employing firearms or conventional explosive devices remain far more likely. Historical use has been in close densely occupied structures (underground, buildings) or targeted at specific individuals (**Ref. 11**) rather than the open road network.	N	N/A
Technological or Manmade Hazards	Malicious Attacks	Transport systems	N	N	N	Potential systems would include (but are not limited to) railways, buses, passenger ferries, cargo vessels and aircraft (**Ref. 11**).	N	N/A
Technological or Manmade Hazards	Malicious Attacks	Crowded places	N	N	N	Part A does not fall within the definition of a crowded place, i.e. pedestrian routes and other thoroughfares as well as sports arenas, retail outlets and entertainment spaces (**Ref. 11**).	N	N/A
Technological or Manmade Hazards	Malicious Attacks	Cyber	N	N	N	Cyber attacks occur almost constantly on key national and commercial electronic information, control systems and digital industries. There are no motorway type communications or traffic signal technology currently proposed. The only technology that is proposed is emergency roadside telephones.	N	
Technological or Manmade Hazards	Malicious Attacks	Infrastructure	N	N	N	Terrorists in the UK have previously attacked, or planned to attack, national infrastructure. Attempts were made to attack electricity substations in the 1990s. Bishopsgate, in the City of London, was attacked in 1993 and South Quay in London's Docklands in 1996. These attacks resulted in significant damage and disruption but relatively few casualties. An attack on Part A would have minimal impact on local infrastructure and therefore unlikely to be considered a high-profile attack.	N	N/A

Appendix D

RISK RECORD

This is an extract from the Major Events assessment process of those risk events to which Part A is potentially vulnerable. Therefore, it should be noted that the ID numbers do not run sequentially.

ID	MAD Scoping Group & Category	Risk Event (high level)	Section of Part A	Hazard Description	Applicable Phases (C=Construction, O=Operational, M=Maintenance)	Hazard sources and/or pathways	Risk Description	Documentation in which the event is/will be addressed	Reasonable worst consequence if event did occur	Air quality	Climate	People and Communities	Biodiversity	Cultural Heritage	Geology and Soils	Landscape and visual	Noise and vibration	Transport	Material resources	Road Drainage and the Water	Primary mitigation	Could this constitute a major	Justification	Is this ALARP with existing mitigation?	Clarification
1	Natural Hazards: Climatological and Metrological	Extreme weather (flood)	Route wide	Unknown conditions about watercourses where it will be diverted or additional infrastructure to be installed. Surface water runoff from the existing A1 is currently collected by a system of gullies and transported to a number of outfalls to various watercourses along Part A through an underground piped system. The location and condition of the existing outfalls is currently uncertain at the time of this assessment.	C,M, O	Flood due to incorrect design	Potential flooding and especially a risk where areas Part A are below the level of the water table. Impact on habitats and wildlife mitigation.	Flood Risk Assessment CDM Register	Flooding affecting neighbouring property.		X	X	X	X	X					X	Where the existing drainage infrastructure is considered to have too many defects and not be of an appropriate standard the existing infrastructure will be abandoned and replaced with new. The existing surface water drainage infrastructure located along the de-trunked' section will also be improved as part of Part A to ensure that the infrastructure is of a suitable standard.	N	The proposed drainage strategy restricts surface water runoff rates to the existing greenfield runoff values for the equivalent storm event. Attenuation controls would be provided for the 1 in 100 year plus climate change scenario.	N/A	ALARP not considered as does not meet the criteria of a major accident.

ID	MAD Scoping Group & Category	Risk Event (high level)	Section of Part A	Hazard Description	Applicable Phases (C=Construction, O=Operational, M=Maintenance)	Hazard sources and/or pathways	Risk Description	Documentation in which the event is/will be addressed	Reasonable worst consequence if event did occur	Air quality	Climate	People and Communities	Biodiversity	Cultural Heritage	Geology and Soils	Landscape and visual	Noise and vibration	Transport	Material resources	Road Drainage and the Water	Primary mitigation	Could this constitute a major	Justification	Is this ALARP with existing mitigation?	Clarification
4	Natural Hazards: Hydrology	Collapse / damage to structures	Bridge over River Coquet	Fluvial flooding.	O,M	Flooding of the River Coquet	Flooding leading to damage to infrastructure and deterioration of materials (e.g. scouring and erosion of embankments). The northbound abutment for the River Coquet Bridge has been the subject of an assessment during recent maintenance periods. The geomorphological map outlines the area where rotational slips have occurred within the bedrock and superficial soils. Potential slope failures in this area will be a key risk for the development of the design for this proposal.	CDM register Design Concept Report Planned Inspection and Maintenance assessment Flood risk assessment	Death and / or injury to members of the public.		X								X	Geotechnical report informing the design of the bridge footings and embankment. Inclusion in project risk register until risk designed to be ALARP.	Y	Could cause loss of life or permanent injury.	Y	Assuming primary mitigation effectively managed and implemented.

ID	MAD Scoping Group & Category	Risk Event (high level)	Section of Part A	Hazard Description	Applicable Phases (C=Construction, O=Operational, M=Maintenance)	Hazard sources and/or pathways	Risk Description	Documentation in which the event is/will be addressed	Reasonable worst consequence if event did occur	Air quality	Climate	People and Communities	Biodiversity	Cultural Heritage	Geology and Soils	Landscape and visual	Noise and vibration	Transport	Material resources	Road Drainage and the Water	Primary mitigation	Could this constitute a major	Justification	Is this ALARP with existing mitigation?	Clarification
5	Natural Hazards: Hydrology	Extreme weather (flood)	River Coquet, Longdike Burn (and the Poxtondean Burn that discharges into the Longdike Burn), Earsdon Burn, the River Lyne and Floodgate Burn	Surface water flooding.	C,M, O	Heavy precipitation on Part A which the drainage network cannot cope with risks due blockage, channel roughness, downstream water and exceedance events.	A review of the Environment Agency Flood Risk from Surface Water map indicates that sections of Part A are at high, medium and low risk of flooding from surface water sources The HADDMS online database indicates that the Morpeth to Felton section of the existing A1 has eight documented historical surface water flood events of which 2 are detailed as high severity events resulting in the total closure of the carriageway.	Flood Risk Assessment Road drainage network design specification	Death and / or injury to road users			X			X			X		X	Part A will match or reduce existing 1 in 1 year (100% AEP), 1 in 30 year (3.3% AEP) and 1 in 100 year (1% AEP) plus 20% climate change greenfield runoff rates. The increases in runoff volume will be stored and attenuated in a network of detention basins at strategic locations along the length of Part A	Y	Could cause loss of life or permanent injury.	Y	Assuming primary mitigation effectively managed and implemented.

ID	MAD Scoping Group & Category	Risk Event (high level)	Section of Part A	Hazard Description	Applicable Phases (C=Construction, O=Operational, M=Maintenance)	Hazard sources and/or pathways	Risk Description	Documentation in which the event is/will be addressed	Reasonable worst consequence if event did occur	Air quality	Climate	People and Communities	Biodiversity	Cultural Heritage	Geology and Soils	Landscape and visual	Noise and vibration	Transport	Material resources	Road Drainage and the Water	Primary mitigation	Could this constitute a major	Justification	Is this ALARP with existing mitigation?	Clarification
6	Natural Hazards: Hydrology	Extreme weather (flood)	Morpeth relating to Cotting Burn. Felton relating to Bradley Brook, Back Burn and other watercourses. River Coquet	Fluvial flooding.	C,M, O	The River Coquet, Longdike Burn (and the Poxtondean Burn that discharges into the Longdike Burn), Earsdon Burn, the River Lyne and Floodgate Burn.	Historic flood incidents identified during public consultation. An existing outfall from the A1 surface water drainage system understood to discharge into the Back Burn without any attenuation. Anecdotal evidence suggests it contributed to flooding at nearby properties. Another historic flooding issue occurred 500 m to the west of existing A1 and was associated with tributary of Fenrother Burn. Consultation with NCC highlighted issues regarding fluvial flooding from watercourses	Flood Risk Assessment	Flooding affecting neighbouring property.			X			X			X		X	Design of bridge over River Coquet and culverts informed by FRA.	N	FRA indicates no or significant increase over baseline risk.	N/A	ALARP not considered as does not meet the criteria of a major accident.

ID	
MAD Scoping Group & Category	
Risk Event (high level)	
Section of Part A	
Hazard Description	
Applicable Phases (C=Construction, O=Operational, M=Maintenance)	
Hazard sources and/or pathways	
Risk Description	including: in Morpeth relating to Cotting Burn; Felton relating to Bradley Brook, Back Burn and others. Performance of attenuation features associated with the existing alignment of the A1 near Felton. The NCC Level 1 Strategic Flood Risk Assessment: significant flooding within the NE Northumberl and river catchments from fluvial sources since 1744. A number of significant flood events are attributed to the River Coquet and impacted settlements and roads within 0.5km.
Documentation in which the event is/will be addressed	
Reasonable worst consequence if event did occur	
Air quality	
Climate	
People and Communities	
Biodiversity	
Cultural Heritage	
Geology and Soils	
Landscape and visual	
Noise and vibration	
Transport	
Material resources	
Road Drainage and the Water	
Primary mitigation	
Could this constitute a major	
Justification	
Is this ALARP with existing mitigation?	
Clarification	

ID	MAD Scoping Group & Category	Risk Event (high level)	Section of Part A	Hazard Description	Applicable Phases (C=Construction, O=Operational, M=Maintenance)	Hazard sources and/or pathways	Risk Description	Documentation in which the event is/will be addressed	Reasonable worst consequence if event did occur	Air quality	Climate	People and Communities	Biodiversity	Cultural Heritage	Geology and Soils	Landscape and visual	Noise and vibration	Transport	Material resources	Road Drainage and the Water	Primary mitigation	Could this constitute a major	Justification	Is this ALARP with existing mitigation?	Clarification
9	Technological or Manmade Hazards: Industrial and Urban Accidents	Collapse / damage to structures	Route wide	Restricted access causing difficulties with manoeuvring heavy construction plant. Increased traffic.	C	Construction activities adjacent to existing structures and live roads.	Damage to existing road infrastructure leading to injury of member of the public or workers.	CDM register	Collapse/impact leads to harm to members of public.			X						X			Construction traffic management plan. Consultation with the Local Authority on suitability to use the local road network.	Y	Could cause loss of life or permanent injury	Y	Assuming actions from the CDM register and traffic management plan are implemented.
10	Technological or Manmade Hazards: Industrial and Urban Accidents	Collapse / damage to structures	Route wide	Presence of unrecorded mine workings. The entire route corridor has been assessed to have moderate risk associated with the presence of shallow mine workings.	O,M	Mine workings	Collapse of a mine workings leading to collapse of the roadway into a void.	Ground Conditions Report CDM Register	Death and / or injury to members of the public.			X						X			Ground instability risks will be mitigated as part of the construction phase works (i.e. grouting).	Y	Could cause loss of life or permanent injury.	Y	Assuming primary mitigation effectively managed and implemented.
13	Technological or Manmade Hazards: Industrial and Urban Accidents	Fire and / or explosion or release of harmful gas	Route wide	Presence of underground services/utilities -sewers, gas, electricity, potable water, telecoms/data and surface/storm water drainage.	C	Presence of existing utilities within the Part A area which are nearby to residential and commercial properties.	Striking of underground services/utilities	CDM register	Fire and/or explosion affects neighbouring property and/or members of the public.			X			X						Location of utilities is obtained from the statutory undertakers and how Part A will affect the utilities is discussed and any diversions required are highlighted. This information is then used in the	Y	Could cause loss of life or permanent injury; or significant structural property damage.	Y	Assuming: - Route will be swept with a cable+AH2: AH38 avoidance tool (CAT) prior to breaking ground. - Construction Phase H&S plan.

ID	MAD Scoping Group & Category	Risk Event (high level)	Section of Part A	Hazard Description	Applicable Phases (C=Construction, O=Operational, M=Maintenance)	Hazard sources and/or pathways	Risk Description	Documentation in which the event is/will be addressed	Reasonable worst consequence if event did occur	Air quality	Climate	People and Communities	Biodiversity	Cultural Heritage	Geology and Soils	Landscape and visual	Noise and vibration	Transport	Material resources	Road Drainage and the Water	Primary mitigation	Could this constitute a major	Justification	Is this ALARP with existing mitigation?	Clarification
																					detailed design of Part A. Positive identification of all the utilities prior to starting				
14	Technological or Manmade Hazards: Industrial and Urban Accidents	Fire and / or explosion or release of harmful gas	Causey Park	Presence of underground cross-country gas high pressure pipeline (National Grid Gas PLC Feeder Main 13 Simprim/Corbridge).	C	Presence of underground cross-country gas high pressure pipeline (National Grid Gas PLC Feeder Main 13 Simprim/Corbridge near residential properties in proximity to Helm.	Striking of underground services/utilities.	CDM register	Fire and/or explosion affects neighbouring property and/or members of the public.			X			X						Management of change process (utilities provider), actions identified in the CDM register, coordination & cooperation between all parties involved, use of good engineering practices.	Y	Could cause loss of life or permanent injury; or significant structural property damage.	Y	Assuming: - Route of pipeline chosen to minimise crossover of other known buried services/utilities. - Route will be swept with a cable avoidance tool (CAT) prior to breaking ground. - Construction Phase H&S plan.
18	Technological or Manmade Hazards: Industrial and Urban Accidents	Harm to people	Route wide	Earthworks and construction activities (e.g. overturning of crane / dropped load) adjacent to operational areas of the existing structures.	C	Construction activities adjacent to existing structures and live roads.	Damage to highway infrastructure leading to death and/or injury of workers and road users.	CDM register Lifting Operations Plan	Collapse/impact leads to harm to construction and other workers and road users in the vicinity.			X						X			Construction phase H&S plan	Y	Could cause loss of life or permanent injury.	Y	Assumes the effective implementation of the construction phase H&S plan.

ID	MAD Scoping Group & Category	Risk Event (high level)	Section of Part A	Hazard Description	Applicable Phases (C=Construction, O=Operational, M=Maintenance)	Hazard sources and/or pathways	Risk Description	Documentation in which the event is/will be addressed	Reasonable worst consequence if event did occur	Air quality	Climate	People and Communities	Biodiversity	Cultural Heritage	Geology and Soils	Landscape and visual	Noise and vibration	Transport	Material resources	Road Drainage and the Water	Primary mitigation	Could this constitute a major	Justification	Is this ALARP with existing mitigation?	Clarification
24	Technological or Manmade Hazards: Industrial and Urban Accidents	Major road traffic accident and large scale gas release	Causey Park	Modified existing gas pipeline beneath A1	C,M, O	Modified pipeline shifting or collapsing.	Destabilisation of A1 leading to collapse and potential gas explosion due to vehicles igniting released gas.	CDM register Pipeline Safety Report	Death and / or injury to road users.			X						X			Management of change process (utilities provider), actions identified in the CDM register, coordination & cooperation between all parties involved, use of good engineering practices.	Y	Could cause loss of life or permanent injury.	Y	Assuming: - Route of pipeline chosen to minimise crossover of other known buried services/utilities. - Route will be swept with a cable avoidance tool (CAT) prior to breaking ground. - Construction Phase H&S plan.
25	Technological or Manmade Hazards: Malicious Attacks	Fire and / or explosion or release of harmful gas	Eshott airfield area	Unexploded ordnance	C	Presence of unexploded ordnance.	During ground investigation or construction discovering UXO. Borehole drilling rigs encountering buried ordnance and force and vibration causing explosion	Ground Conditions Report CDM Register	Fire and/or explosion affects neighbouring property and/or those people in the immediate area.			X	X	X							Provide possible procedures, protocols and training required during the construction phase.	Y	Long lasting damage to the built environment.	Y	Assuming that a UXO survey prior to any opening of ground (e.g. ground investigation, utilities) is completed.

ID	MAD Scoping Group & Category	Risk Event (high level)	Section of Part A	Hazard Description	Applicable Phases (C=Construction, O=Operational, M=Maintenance)	Hazard sources and/or pathways	Risk Description	Documentation in which the event is/will be addressed	Reasonable worst consequence if event did occur	Air quality	Climate	People and Communities	Biodiversity	Cultural Heritage	Geology and Soils	Landscape and visual	Noise and vibration	Transport	Material resources	Road Drainage and the Water	Primary mitigation	Could this constitute a major	Justification	Is this ALARP with existing mitigation?	Clarification
40	Technological or Manmade Hazards: Transport accidents	Major road traffic accident	Route wide	Increased traffic speeds (70 mph)	O	Bus pulling out into traffic moving at high speed.	Increased traffic speeds (new maximum speed limit will be 70 mph) will potentially increase the severity of RTAs which occur, especially if bus routes and stops are maintained whereby they are pulling out into traffic moving at high speeds.	Design Concept Report CDM Register	Death and / or injury to members of the public and/or road users.			X						X			Implementation of recommendation of road safety report.	Y	Could cause loss of life or permanent injury.	Y	Assuming primary mitigation effectively managed and implemented.
41	Technological or Manmade Hazards: Transport accidents	Major road traffic accident	Bridge over B6345 from Old Swarland to West Thirston	Existing road bridges loaded with additional construction traffic e.g. piling rigs.	C	Debris striking traffic / member of public	Unknown safe capacity of road bridges - Overloading leading to structural instability - injuries to road users and construction personnel.	CDM register	Death and / or injury to members of the public			X						X			Confirming the loading capacity of bridges prior to construction works commencing. Provision of information, instruction and training to construction workers and contractors.	Y	Could cause loss of life or permanent injury.	Y	Assuming embedded mitigation effectively managed and implemented.

ID	MAD Scoping Group & Category	Risk Event (high level)	Section of Part A	Hazard Description	Applicable Phases (C=Construction, O=Operational, M=Maintenance)	Hazard sources and/or pathways	Risk Description	Documentation in which the event is/will be addressed	Reasonable worst consequence if event did occur	Air quality	Climate	People and Communities	Biodiversity	Cultural Heritage	Geology and Soils	Landscape and visual	Noise and vibration	Transport	Material resources	Road Drainage and the Water	Primary mitigation	Could this constitute a major	Justification	Is this ALARP with existing mitigation?	Clarification
42	Technological or Manmade Hazards: Transport accidents	Major Road Traffic Accident Collapse / damage to structure	B6345 from Old Swarland to West Thirston	Phased construction of bridge in immediate proximity of operational public highway.	C	Falling objects cause road traffic accident	1) Injury to third parties. 2) Debris falling on public highway resulting in accident. 3) Damage to third party utilities / services located on or near bridges.	CDM register	Death and / or injury to members of the public			X						X			Construction phase H&S plan	Y	Could cause loss of life or permanent injury.	Y	Assuming the effective implementation of the construction phase H&S plan.

Major Accidents and Disasters Assessment

A1 in Northumberland: Morpeth to Ellingham

Part B: Alnwick to Ellingham

CONTENTS

TABLES

FIGURES

APPENDICES

1. INTRODUCTION

1.1. REQUIREMENT FOR ASSESSMENT

1.1.1. This report addresses the potential vulnerability of the A1 in Northumberland: Morpeth to Ellingham Scheme (hereafter referred to as the Scheme), Part B: Alnwick to Ellingham (hereafter referred to as Part B) to major accident(s) and/or disaster(s) as required by the Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017 (as amended by The Infrastructure Planning (Environmental Impact Assessment) (Amendment) Regulations 2018) (the EIA Regulations) (**Ref. 1**).

1.1.2. The EIA Regulations (Schedule 4, Paragraph 8) require that: '*A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to EU legislation such as Directive 2012/18/EU of the European Parliament and of the Council(c) or Council Directive 2009/71/Euratom(d) or UK environmental assessments may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies*.'

1.2. SCHEME LOCATION AND DESCRIPTION

1.2.1. Part B location and description is included in **Chapter 2: The Scheme, Volume 1** of this Environmental Statement (ES) (**Application Document Reference: TR010041/APP/6.1**).

1.3. PURPOSE OF THE REPORT

1.3.1. This Major Accidents and Disasters (hereafter referred to as Major Events) Assessment Report has been produced in accordance with the EIA Regulations (**Ref. 1**), and the Design Manual for Roads and Bridges (DMRB) (Volume 11, Section 2, Part 5) (**Ref. 2**).

1.3.2. This report describes the assessment methodology and mitigation within Part B design adopted for the purposes of the assessment. It provides a summary of the expected significant effects resulting from the vulnerability of Part B to the risk of Major Events, taking into account relevant legislation and guidance applicable in England. Where appropriate, this description includes the further mitigation measures required to prevent, reduce or offset any significant negative effects, the preparedness for and proposed response to emergencies, and the expected residual effects after these measures have been employed.

1.3.3. This report addresses responses from the Planning Inspectorate in relation to Major Events within the **Scoping Opinion – Part B** (**Application Document Reference: TR010041/APP/6.13**) Section 3.3, published in December 2018, including formal responses from statutory consultees. Based on the feedback in the **Scoping Opinion – Part B**

(**Application Document Reference: TR010041/APP/6.13**), the scoping exercise was revisited (refer to **Section 4**) to inform the Major Events assessment.

1.3.4. This report (and its associated figures and appendices) is intended to be read as part of the wider ES within **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**), with particular reference to **Chapter 5: Air Quality**, **Chapter 6: Noise and Vibration**, **Chapter 7: Landscape and Visual**, **Chapter 8: Cultural Heritage**, **Chapter 9: Biodiversity**, **Chapter 10: Road Drainage and the Water Environment**, **Chapter 11: Geology and Soils**, **Chapter 12: Population and Human Health**, **Chapter 13: Material Resources** and **Chapter 14: Climate**.

1.4. COMPETENT EXPERT EVIDENCE

1.4.1. **Table 1-1** below demonstrates that the professionals contributing to the production of this chapter have sufficient expertise to ensure the completeness and quality of this assessment.

Table 1-1 – Qualifications and Professional Membership

Name	Role	Qualifications and Professional Memberships	Experience
Colin Chambers	Approver	– MSc Occupational and Environmental Health and Safety Management – BSc (Hons) Chemical Engineering – European Engineer – Chartered Engineer – Chartered Environmentalist – Chartered Scientist – Fellow of the Institute of Chemical Engineers – Member of the Society for the Environment – Practitioner of the Institute of Environmental Management and Assessment – Graduate Member of Institute of	35 years of experience in the identification, assessment of major accident hazards; preparation of safety reports for Major Accident Hazard sites and emergency preparedness and response. Relevant transport projects: – HS2 Phase 2b major accidents and disasters assessment. – Highways England, A1 Birtley to Coal House major accidents and disasters scoping and assessment – Highways England, A1 Morpeth to Felton major accidents and disasters scoping and assessment. – Highways England, A27 Arundel Bypass major accidents and disasters scoping.

Name	Role	Qualifications and Professional Memberships	Experience
		Occupational Safety & Health	– North Yorkshire County Council, A59 Kex Gill major accidents and disasters scoping and assessment.
Laura Dugdale	Reviewer	– MSc Environmental Management – BSc (Hons) Environmental Science – Chartered Environmentalist – Member of the Society for the Environment – Full member of the Institute of Environmental Management and Assessment – Technical member of the Institute of Occupational Safety & Health	16 years of experience in the identification, assessment of major accident hazards and preparation of safety reports for Major Accident Hazard sites. Relevant transport projects: – HS2 Phase 2b major accidents and disasters assessment. – Highways England, A1 Morpeth to Felton major accidents and disasters scoping and assessment. – Highways England, A27 Arundel Bypass major accidents and disasters scoping.
Karen Phillipson	Author	– MSc (Hons) Integrated Environmental Control – BSc (Hons) Natural Environmental Science – Managing Safely, Institute of Occupational Safety & Health	16 years of experience in performing a range of environmental risk assessments, including the identification and assessment of major hazards. Relevant transport projects: – Highways England, A1 Morpeth to Felton major accidents and disasters scoping and assessment.

1.5. LEGISLATIVE AND POLICY FRAMEWORK

LEGISLATION

International

1.5.1. Paragraph 15 of Directive 2014/52/EU (**Ref. 3**) states:

"In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment. For such projects, it is important to consider their vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment."

National

1.5.2. The above EU Directive has been transposed into UK law through the EIA Regulations (**Ref. 1**). Schedule 4 Paragraph 8 of the EIA Regulations require that the ES include:

"(8). A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to EU legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or UK environmental assessments may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies."

1.5.3. It is worth noting that the UK approach has removed the word 'natural' with respect to 'disasters'. An article written by a registrant of the EIA Quality Mark Registrant Scheme of the Institute of Environmental Management and Assessment (IEMA) suggests that given the intention underlying this aspect of the EU Directive, both manmade and natural disasters should be considered (**Refs. 4, 5** and **6**).

1.5.4. The applicable legislative framework covering the design, construction, operation and maintenance of Part B is summarised as follows, further details are presented in **Appendix A** of this report:

a. Health and Safety at Work etc. Act 1974 (HSWA) (**Ref. 7**); and
b. Construction (Design and Management) Regulations 2015 (CDM) (**Ref. 8**).

POLICY

1.5.5. There are no policy documents applicable to this report at the time of writing.

2. ASSESSMENT METHODOLOGY

2.1. SCOPE

2.1.1. The Major Events assessment has considered the construction, operation and maintenance phases of Part B. It is highly unlikely that Part B would be demolished after its design life, as the road is likely to have become an integral part of the infrastructure in the area. In the unlikely event of Scheme demolition, this would be subject to the relevant statutory process at that time. The demolition phase of Part B has therefore not been assessed.

2.1.2. The assessment of significant adverse effects on receptors has considered all factors defined in the EIA Regulations, specifically population and human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and the landscape.

2.1.3. Certain receptors have been excluded from the assessment, for the reasons described in **Table 2-1** below.

Table 2-1 – Excluded Receptors

Excluded Receptors	Reason for Exclusion
Employees of Highways England and its suppliers, whether during construction, operation or maintenance of Part B.	Highways England's commitment and obligations to manage risks to employees are described in other documents (for example Highways England's health and safety management system, 'Raising the bar' initiative).
Members of the public who are wilfully trespassing, for example areas designated as a construction site.	Outside the occupier's legal requirements under the Occupier's Liability Act 1984 (**Ref. 9**)

2.2. SCOPING METHODOLOGY

2.2.1. In response to the Planning Inspectorate **Scoping Opinion – Part B** (**Application Document Reference: TR010041/APP/6.13**) a supplementary scoping exercise was undertaken in order to provide evidence for those Major Events that should be taken forward into the assessment. The methodology detailed was followed:

2.2.2. **Stage 1:** A Long List of possible Major Events was developed. This list drew upon a variety of sources, including the UK Government's Risk Register of Civil Emergencies (**Ref. 10**). Low likelihood and low consequence events were scoped out as these events are unlikely to result in significant adverse effects as they do not fall into the definition of a Major Event. Highly likely and low consequence events were also scoped out as they would not lead to significant adverse effects. Furthermore, high likelihood and high consequence events were

also scoped out, as it is assumed that existing legislation and regulatory controls would not permit Part B to be progressed under these circumstances.

2.2.3. **Stage 2:** The Long List was reviewed for any potential accidents and disasters that were considered highly unlikely to occur due to the location of Part B based on information provided by the environmental topic teams and the use of information sources related to Major Events (**Ref. 11, 12, 13, 14** and **15**). If an event type will not occur due to the location of Part B, then a 'N' was indicated under the location risk column. If it was then a 'Y' was given (e.g. a Major Event type of urban accidents or fires) it would not be relevant for a scheme located in a rural area.

2.2.4. **Stage 3:** Remaining items in the Long List were considered based on the sources identified in **Section 2.6** of this report and taking into account the proposed use of the development and phase (i.e. construction, operation, maintenance). If the Major Event was not associated with the proposed use of the development, either at the construction or operation and maintenance phase, a 'N' was indicated. If it is, then a 'Y' was given. Where all columns of an entry in the Long List received a 'N', for an identified Major Event type, this Major Event type was scoped out. If a 'Y' was identified in any of the columns, a Major Event was scoped into the assessment.

2.2.5. Those Major Events that were screened in make up the Short List of Major Events and have undergone further detailed assessment.

2.3. METHOD OF BASELINE DATA COLLECTION

2.3.1. The assessment has utilised baseline information collected from other Technical Chapters of this ES to define the receptors and Part B's vulnerability to a Major Event. In particular, baseline information from Technical Chapters in the ES (e.g. climate, population and human health, biodiversity and road drainage and the water environment) and other documents (e.g. Morpeth to Ellingham Safety Plan (**Ref. 16**) are pertinent to the assessment.

2.3.2. In accordance with Schedule 4 Paragraph 8 of the EIA Regulations (**Ref. 1**), available safety assessments undertaken for Part B have been used to inform the identification and assessment of likely significant environmental effects. For the purposes of Part B these include, for example, CDM risk registers and hazard identification studies current at the time of undertaking the assessment.

2.3.3. The assessment has been based on a review of available documentation and regulatory requirements.

2.3.4. Additional baseline information has been obtained on features external to Part B which could contribute a potential source of hazard to Part B. This information was obtained from a desk based study. Such features included but were not limited to:

a. Presence of Control of Major Accident Hazard (COMAH) sites;
b. Potentially hazardous ground conditions; and
c. Proximity to other infrastructure (road, rail, aviation, energy).

2.4. ASSESSMENT METHODOLOGY

2.4.1. To date, there is no specific guidance on how to consider major accidents and disasters within the context of EIA. However, the assessment takes account of emerging EIA good practice, which refers to other relevant documentation, including the Cabinet Office's National Risk Register of Civil Emergencies (**Ref. 10**).

2.4.2. The assessment of Major Events has been achieved through a review of available documentation and regulatory requirements; the EIA has not involved assessment from 'first principles' as it is recognised that existing legislation and health and safety (H&S) requirements already identify risks and help to protect human beings and the environment (**Appendix A** of this report).

2.4.3. The assessment has presented any identified risks along with whether they are managed to be As Low As Reasonably Practicable (ALARP) or require further precautionary mitigation actions beyond those already integrated into the design and execution of Part B (for example the **Outline Construction Environmental Management Plan (Outline CEMP)** (**Application Document Reference: TR010041/APP/7.3**).

2.4.4. The potential for identified relevant Major Events to result in a significant adverse environmental effect have been evaluated using a risk based approach. The approach has considered the environmental consequences of a Major Event, the likelihood of these consequences occurring, taking into account planned design, mitigation within the design, and the acceptability of the subsequent risk to the environment. The following process was applied to each of the scoped in Major Event categories:

a. Identifying risks;
b. Screening these risks;
c. Defining the impact;
d. Assessing the likelihood; and
e. Assessing the risk.

IDENTIFY RISKS

2.4.5. The Major Events considered in the assessment are rare events.

2.4.6. All low consequence events, whatever their likelihood, do not meet the definition of Major Events (refer to **Section 5**). For example, minor spills which may occur during construction, but would be limited in area and volume and temporary in nature do not meet the definition of a major accident. Such minor events would be dealt with under the main contractor's or managing agent contractor's (MAC) Environmental Management System (EMS) and do not fall within the scope of this assessment.

2.4.7. This assessment focuses on low likelihood, but potentially high consequence events as illustrated in **Figure 1** below**.**

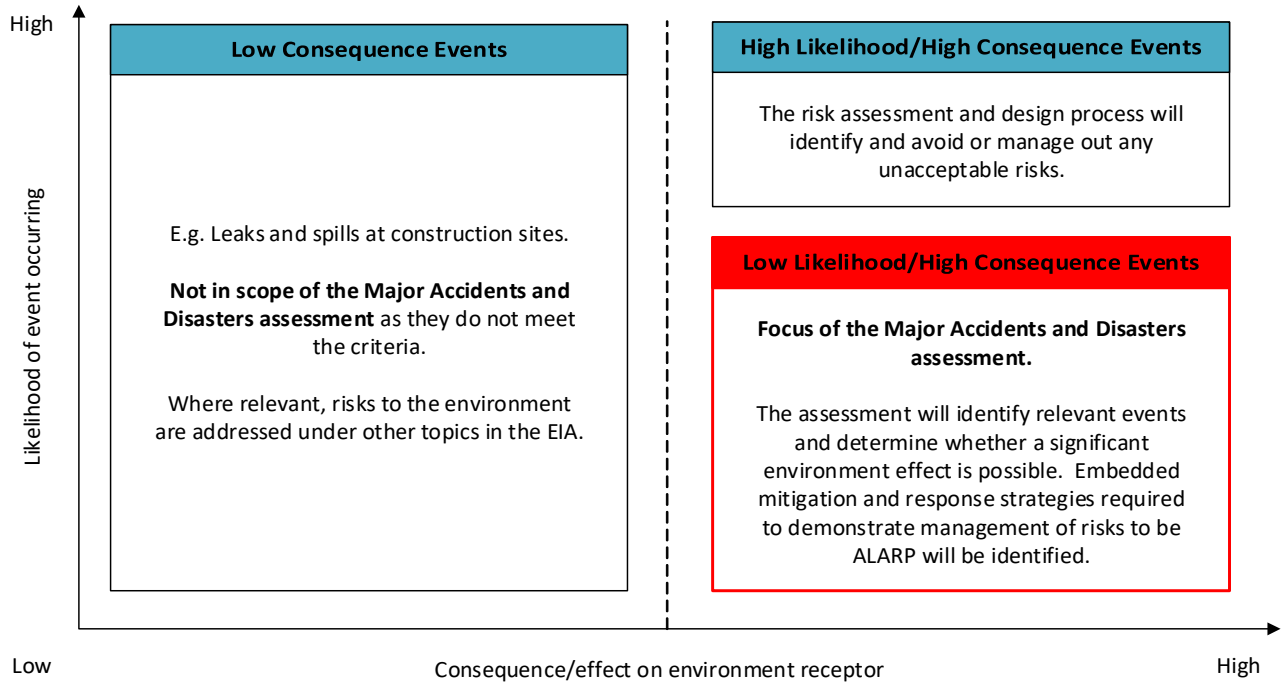

Figure 1 - Graphical Representation of Major Accidents and Disasters Consequence Significance

2.4.8. Low likelihood is defined for the purposes of this assessment, as an event that may occur during the lifetime of Part B, so no more than once in 10 years for the construction phase, and no more than once in 100 years for the operational phase.

2.4.9. This is an upper boundary for low likelihood. Very low likelihood events have also been included in the assessment, which may only occur at most once in every 1,000 years. Mitigation measures reflect what is reasonable for such rare events, considering their potential consequence, within the guiding principle of risks being ALARP.

2.4.10. High consequence events are considered to lead to a significant adverse effect.

2.4.11. The risk identification process has used existing sources of information wherever possible, as described in **Section 2.3**, such as risk assessments undertaken for Part B as part of other processes (many of which are required by law) or Risk Events identified within the UK's current National Risk Register (**Ref. 10**). No additional risk assessments have been undertaken and the risk identification activity has focused on collating and reviewing the existing sources.

2.4.12. In order to identify whether a Risk Event has the potential to be a Major Event, which also has the potential to have a significant adverse effect on an environmental receptor, three components need to be present: a source, a pathway (between source and receptor) and a receptor. As such, and as recommended by the Department for the Environment, Food and Rural Affairs (Defra) (**Ref. 17**), the assessment uses the following conceptual model:

a. The source is the original cause of the hazard, which has the potential to cause harm;

b. The pathway is the route by which the source can reach the receptor; and
c. The receptor, which is the specific component of the environment that could be adversely affected, if the source reaches it.

2.4.13. Risk Events which do not have all three components have been screened out from the assessment.

SCREEN RISKS

2.4.14. The following screening process has been used to identify those Risk Events which would require further consideration within the assessment:

1. Is there a potential source, pathway or receptor as defined in **paragraph 2.4.12** above? If not, no further assessment required;
2. Is there a relevant environmental receptor (refer to **Section 2.1**) present in the locations where the risk event could occur, and a pathway whereby the source of harm can reach the receptor? If not, no further assessment required; and
3. Does the potential impact on the environmental receptor meet the definition of a significant adverse effect given in **paragraph 2.4.10**. If not, no further assessment required.

2.4.15. For those Risk Events which are not screened out during the three-step process, the following assessment methodology has been used. The assessment forms the basis for recommending additional mitigation measures, as appropriate.

DEFINE IMPACT

2.4.16. Several mechanisms are in place to reduce the vulnerability of Part B to Major Events or mitigate significant effects on the environment should they occur. All measures to manage and reduce risk of significant adverse effects occurring as a result of the vulnerability of Part B to Major Events are considered to be primary mitigation measures for the purposes of the assessment. It has been assumed that:

a. The design of Part B would take into consideration the relevant potential mitigation measures set out in National Policy Statement for National Networks (NPS NN) (**Ref. 18**), as detailed in the **NPS NN Accordance Table** (**Application Document Reference: TR010041/APP/7.2**);
b. The design of Part B would be subject to relevant Road Safety studies and actions identified and integrated into the final design to reduce risks to as low as reasonably practicable;
c. The design, installation, commissioning, operation and maintenance of plant, drainage systems, equipment and machinery, including associated systems, would take into account Good Engineering Practice (GEP); and
d. The construction stage(s) of Part B would be managed through the implementation of the Construction Phase Plan and CEMP, as detailed in the **Outline CEMP** (**Application Document Reference: TR010041/APP/7.3**).

2.4.17. This framework and the measures therein of relevance to the assessment are described in **Volume 1** and **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**).

2.4.18. A reasonable worst case environmental impact(s) has been identified for each scoped-in Risk Event. Impacts have been identified in consultation with relevant disciplines for each environmental topic within the ES. The environmental impacts are identified through a qualitative process which seeks to answer the question 'could this event constitute a major accident or disaster in terms of the definitions provided?' (refer to **Section 1.4**). Where relevant, specific sensitive receptors around Part B are considered (see **Table 3-1**). The Risk Record (**Appendix C** of this report), records the outcome of this process.

ASSESS RISK

2.4.19. The likelihood of the reasonable worst case environmental effect(s) occurring has been evaluated taking into account the following:

a. The likelihood of the risk event occurring considering the measures already within the design and execution of Part B; and
b. The likelihood that an environmental receptor is affected by the risk event.

2.4.20. Likelihood assessments evaluate whether the effect (for example, loss of life) is a possible outcome of the risk event.

2.4.21. This evaluation refers to existing risk assessments as well as consultation with relevant discipline specialists.

2.4.22. The assessment of the risk has been carried out using a major accidents and disasters assessment tool. Where likely significant adverse effects are identified, mitigation measures must be in place, commensurate with the likelihood of the event occurring. The assessment considers, in consultation with relevant disciplines, whether the risk to the environmental receptor is managed to be ALARP with the existing measures. If gaps are identified, where the existing measures do not represent management of risks to an environmental receptor to be ALARP, then additional measures would be required. The Risk Record presented in **Appendix C** of this report records the outcome of the assessment.

APPRAISE RISK MANAGEMENT OPTIONS

2.4.23. Risk management options fall into the following categories:

a. Eliminate (or 'avoid') the risk, by adopting alternative processes to eliminate the source of the hazard, or remove the receptor;
b. Reduce the risk by adapting proposed processes such that either the likelihood or the impact of the risk event can be reduced;
c. Isolate the risk, by using physical measures to ensure that should the risk event occur, it can be effectively isolated such that there is no pathway;
d. Control the risk, by ensuring that appropriate control measures are in place (for example emergency response) so that should a risk event occur, it can be controlled and

managed appropriately. The EIA mitigation hierarchy of repair and compensate any significant damage to environmental receptors may then apply following a control measure; and

e. Exploit the risk, if it presents potential benefits or new opportunities.

2.4.24. As safety risks would be required to be adequately addressed within the regulatory framework for Part B, it is not anticipated that significant residual effects would be identified as an output of the assessment.

2.5. ASSESSMENT OF POTENTIAL MAJOR EVENTS

2.5.1. The process involved the use of professional judgement taking into account the following factors:

a. The geographic extent of the effects. Effects beyond the Order Limits are more likely to be considered significant;
b. The duration of the effects. Effects which are permanent (specifically irreversible) or long lasting are considered significant;
c. The severity of the effects in terms of number, degree of harm to those affected and the response effort required. Effects which trigger the mobilisation of substantial civil emergency response effort are likely to be considered significant;
d. The sensitivity of the identified receptors; and
e. The effort required to restore the affected environment. Effects requiring substantial clean-up or restoration efforts are likely to be considered significant.

2.6. DATA SOURCES

2.6.1. The following data sources were used in the preparation of this assessment report:

a. Cabinet Office, National Risk Register of Civil Emergencies, 2017 Edition (**Ref. 10**).
b. The International Disaster Database (**Ref. 12**).
c. British Geological Survey Geo Index Onshore (**Ref. 13**).
d. Prevention Web Europe: Tsunamis Hazard Map (**Ref. 14**).
e. Met Office (2013) England and Wales drought 2010-2012 (**Ref. 15**).
f. Environment Agency (January 2012) Yorkshire and North East Region Drought Plan (**Ref. 19**).
g. Northumbrian Water Draft Drought Plan 2018, Northumbrian water, August 2017 (**Ref. 20**).
h. A1 in Northumberland Morpeth to Ellingham Safety Plan, February 2018. (**Ref. 16**).
i. Health & Safety Executive's Planning Advice Web App (**Ref. 21**).
j. Health & Safety Executive's COMAH 2015 Public Information Search (**Ref. 22**).

2.7. POLICY AND GUIDANCE

2.7.1. There is currently no applicable policy relating to the methodology for assessing Major Events.

2.7.2. There is currently no published guidance for the application of the legal requirements to Major Events. However, selected relevant guidance for risk assessment methodologies is summarised as follows; further details are presented in **Appendix A** of this report:

a. Defra (2011) 'Guidelines for Environmental Risk Assessment and Management (**Ref. 17**).
b. Chemical and Downstream Oil Industries Forum, (2013), Guideline - Environmental Risk Tolerability for COMAH Establishments (**Ref. 23**).
c. The International Standards Organization's ISO 31000: 2009 Risk Management - principles and guidelines (**Ref. 24**).

2.7.3. To date, there is no specific guidance on how to consider Major Events within the context of EIA. However, a process has been used which takes account of emerging EIA good practice (**Refs. 2, 4, 5, 6** and **17**) which refers to other relevant documentation, including the Cabinet Office's National Risk Register of Civil Emergencies (**Ref. 10**) and experience in major accident hazard identification when preparing Safety Reports relating to the prevention and control of major accident hazards (**Refs. 25, 26, 27, 28, 29, 30** and **31**)

2.8. STUDY AREA

2.8.1. The Study Area for Major Events has been developed based on professional judgement using knowledge and experience of similar schemes as there is no specific regulatory guidance nor significant precedent or standardised methodology.

2.8.2. At the supplementary scoping stage, a 5 km corridor either side of the centreline of the A1 carriageway was used in order to capture internal and external influencing factors which may have high adverse consequences on Part B. The following factors and associated distances (from the centreline of the A1 carriageway) were adopted for setting the Study Area in order to capture the following:

a. Manmade features:

i. COMAH facilities within 5 km
ii. Major accident pipelines within 1 km
iii. Fuel retail sites (including Liquified Natural Gas, Liquified Petroleum Gas) within 1 km
iv. Rail infrastructure within 1 km and
v. Transmission (gas, electrical, oil and fuels) crossing the Order Limits

b. Natural features with the potential to create risks within:

i. 3 km (chiefly hydrological and geological, for example dam failure and seismic activity respectively) and
ii. 1 km (chiefly hydrological and geological, for example flood risk and unstable ground conditions respectively).

2.8.3. The extent of the Study Area used for the Major Events assessment is a narrower area that that used for the supplementary scoping study as the updated scoping work found that the key influencing external factors lay within a 1 km corridor either side of the centreline of Part B.

2.9. ASSUMPTIONS AND LIMITATIONS

2.9.1. Key assumptions for the major accidents and disasters assessment are that:

a. Part B is being designed and its implementation guided by other industry standards and codes, many of which are mandatory. These require infrastructure and systems to be designed so that risks to people and the environment are either eliminated or reduced to levels that are ALARP.
b. Environmental effects associated with unplanned events that do not meet the definition of a major accident or disaster e.g. minor leaks and spills that may be contained within the construction sites are addressed in the ES and not in this assessment.
c. It is recognised that the management framework for Part B is not fully defined at this stage; however, a presumption of standard practice and regulatory compliance within the adopted management framework has been assumed and would be developed following the appointment of the main contractor.
d. The design of Part B would take into consideration the relevant potential mitigation measures set out in the NPS NN (**Ref. 18**).
e. The design of Part B would be subject to relevant Road Safety studies and actions identified and integrated into the final design to reduce risks to as low as reasonably practicable.
f. The design, installation, commissioning, operation and maintenance of plant, drainage systems, equipment and machinery, including associated systems, would take into account GEP.
g. The environmental management of the construction stage(s) of Part B would follow the measures as detailed within the Construction Phase H&S Plan and CEMP.

2.9.2. The following limitations apply to this assessment:

a. No site visits were conducted, the assessment was desk-based.
b. No modelling or detailed calculations were undertaken, the qualitative assessment took the form of ‘sign-posting’ to existing risk assessments, and assessment of potential gaps or residual risks which are not considered to be managed using the ALARP principle.
c. Where information was not available, professional judgement was used to reach a conclusion.
d. In accordance with good safety management principles, it was assumed that all risks that have the potential to be major accidents or disasters, and could impact a local environmental receptor, would be managed using the ALARP principle.

3. BASELINE CONDITIONS

3.1. INTRODUCTION

3.1.1. The baseline relevant to this topic comprises:

a. Features external to Part B that contribute a potential source of hazard to Part B;
b. Sensitive environmental receptors at risk of significant effect; and
c. Current (without Part B) major accident and disaster risks.

3.1.2. Within Part B, the existing A1 is a rural single carriageway, subject to the national speed limit, located from the Alnwick bypass dual carriageway to the dual carriageway south of Ellingham.

3.1.3. The existing A1 within the Part B extents has four at-grade major-minor road junctions, with many additional private and farm accesses. Two of the junctions are accommodated with full standard ghost island T-junctions with right turning provision.

3.1.4. This section of carriageway is very straight; the existing carriageway has a high hedge and treeline which gives the impression that the road is narrower than it perhaps is.

3.2. BASELINE FEATURES

3.2.1. As far as is reasonably practicable, the route avoids existing features that have the potential to present a hazard to the construction or operation of Part B. There are no COMAH sites with 5 km corridor either side of the existing carriageway.

3.2.2. Features external to Part B that lie within 1 km of the centreline of Part B that present a potential source of hazard, either during construction or operation or are sensitive receptors are detailed in **Table 3-1** below:

Table 3-1 – Major Events Baseline

Name	Hazard Source or Receptor	Comment	Regulatory Status of Feature	Approximate Distance and Direction from Part B
Middlemoor windfarm	Hazard source	Extra High Voltage cables		Runs to the east of the existing carriageway from southern extent of Part B to existing junction adjacent to Charlton Mires where it transfers to the west.
Eshott Airfield, Felton	Hazard source and receptor	Working airfield with significant flammable fuel storage	Airfield with safeguarding zone	Immediately to the south of the Main Compound and 15 km away from the road.

Name	Hazard Source or Receptor	Comment	Regulatory Status of Feature	Approximate Distance and Direction from Part B
Denwick Burn	Hazard source	Fluvial flood risk	Ordinary watercourse	Southern section of the Study Area to the north west of Denwick
Shipperton Burn	Hazard source	Fluvial flood risk	Ordinary watercourse	To the east of Shipperton Bridge
A1	Hazard source and receptor	A1 between Alnwick and Ellingham: % fatal collisions = 27.27% % serious collisions = 36.36%	GB average single carriageway % fatal collisions = 1.40% % serious collisions = 13.9%	N/A

3.3. BASELINE ACCIDENT AND DISASTER RISKS

3.3.1. Major accident and disaster risks relevant to the baseline in the absence of Part B include extreme weather events and associated flooding and road traffic collisions. Baseline 'without Part B' conditions are described in detail in **Chapter 10: Road Drainage and the Water Environment**, **Chapter 11: Geology and Soils and Chapter 14: Climate, Volume 3 Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**). Those aspects of most relevance to the major accidents and disasters assessment are summarised below.

SURFACE WATER FLOODS

3.3.2. Surface water runoff from the existing A1 is currently collected by a system of gullies and transported to a number of outfalls to various watercourses along Part B through an underground piped system. It is understood that there are no existing flow controls in place.

3.3.3. Historic flood records in the **Flood Risk Assessment (FRA)** (**Appendix 10.1**, **Volume 8** of this ES (**Application Document Reference: TR010041/APP/6.8**)) indicate that there are no historical high severity flood events recorded within the Part B alignment.

DROUGHTS

3.3.4. Droughts are caused by insufficient rainfall and in the UK context, a drought is defined as at least 15 consecutive days where there is no more than 0.2 mm of precipitation.

3.3.5. For England and Wales, the drought of 2010 to 2012 was one of the ten most significant droughts of one to two years duration in the last 100 years. The drought was due to a sequence of dry months from winter 2009/10 to March 2012, particularly in the spring, autumn and winter seasons. The drought resulted in concerns for farming due to the very dry ground, water resources and the environment generally.

3.3.6. Between April 2010 and March 2012, the Part B area received 85-105% of rainfall compared with the 1981-2010 average (**Ref. 15**).

3.3.7. Major impacts from drought is not expected in the North East Area although catchments not supported from reservoirs such as Kielder can be expected to see reduced flows and public concern may be raised the area of Part B (**Ref. 19**).

3.3.8. Northumbrian Water investment in Kielder reservoir, the largest man-made reservoir in Europe, means that restrictions on customers use of water, even during the most severe droughts within the area of Part B, should be not necessary. Northumbrian Water's Levels of Service for 'Appeal for Restraint' frequency is 1 in 20 years, 'Temporary Water Use Ban' and 'Drought Order ban' frequency is never (**Ref. 20**).

HURRICANES, STORMS AND GALES

3.3.9. Hurricanes cannot form in or around the UK as the sea temperatures are not warm enough to sustain a wind of at least 120 km/h, which is one of the measurements used to classify a hurricane. However, deep depressions that were originally hurricanes are experienced in the UK.

3.3.10. According to the latest meteorological data (2017) from Newcastle Airport, the greatest wind speed recorded was 83.52 km/h (in 2017 during Storm Doris).

EXTREME TEMPERATURES: HEATWAVES, LOW (SUB ZERO) TEMPERATURE AND HEAVY SNOW

3.3.11. Between 1981 and 2010, there were five occurrences where summer mean temperatures exceeded 22.6°C on five or more consecutive days.

3.3.12. Between 1981 and 2010, there have been 2,087 days with a maximum minimum temperature below zero degrees Celsius.

3.3.13. Between 1981 and 2010, there were 602 days with snow lying at 0900 hours however, there are no records from the Met Office of the depth of snow.

POOR AIR QUALITY (CONSTRUCTION PHASE)

3.3.14. According to **Chapter 5: Air Quality, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**), current baseline air quality within the Part B extents does not exceed the relevant air quality objectives for NO_x, NO_2, PM_{10} and $PM_{2.5}$. During the construction phase it is anticipated that with appropriate mitigation (specifically measures detailed within the **Outline CEMP** (**Application Document Reference:**

TR010041/APP/7.3) air quality would remain below the relevant air quality objectives for NO_x, NO_2, PM_{10} and $PM_{2.5}$.

BIOLOGICAL – DISEASES

3.3.15. There are no known animal burial pits or other sources of biological diseases within the Order Limits.

INDUSTRIAL ACCIDENTS

3.3.16. There are no industrial sites located in proximity to Part B.

3.3.17. Coal Authority records indicate that part of the Order Limits lies within the Coal Authority Mining Reporting Area with specific sections classified as Development High Risk Areas (DHRA). Most of the DHRA's are within the 250 m buffer rather than Part B itself. There are two DHRAs located where construction works would be taking place: Heckley Fence DHRA and the Rock Midstead DHRA. Eshott Airfield, located at Felton, Northumberland, NE65 9QJ, is an operational airfield located to the south of the Main Compound. Facilities include two tarmac runways, a grass strip, a dedicated F34 JetA1 helicopter pad, hangarage for 80+ aircraft, flight training school, maintenance, livery spraying and running refuels. It was previously an RAF base constructed in World War II (WWII). There is the potential for aircraft accidents or major fires associated with aviation fuel storage and also unexploded ordnance from WWII within the vicinity of the airfield.

POLLUTION INCIDENTS

3.3.18. Surface water runoff from the existing A1 is currently collected by a system of gullies and transported to a number of outfalls to various watercourses along Part B through an underground piped system. It is understood that there are no existing pollution prevention measures in place.

TRANSPORT ACCIDENTS

3.3.19. Along the A1 between Alnwick and Ellingham, over the five-year period (2011-2015) the number of fatalities is 27.27 % of all Personal Injury Collisions (PICs), serious collisions accounted for 36.36 % of PICs and slight collisions accounted 36.36 % of PICs. The percentage of fatal collisions, percentage of serious collisions, percentage of Killed or Seriously Injured (KSI) collisions and casualties, Fatal and Weighted Injuries (FWI) per billion vehicle miles and fatal casualties per billion vehicle miles are all above the GB average within the Part B extents. The cause of the majority of KSI collisions is due to vehicles encroaching on the opposing carriageway.

3.3.20. Between 2011 and 2015, there have been six serious collisions, three fatal collisions and four slight casualties reported on the existing section of the A1 which is being dualled by Part B.

3.3.21. The percentage of collisions that occurred on wet, icy or a snow-covered road surfaces is lower than the 2013 GB average on all non-built up roads and 27.3% of all PICs in the Part B extents involved two or more vehicles.

ELECTRICITY, GAS, WATER SUPPLY OR SEWERAGE SYSTEM FAILURES

3.3.22. There is no foul water drainage or water supply connection to the existing A1 within the area of Part B. However, there are existing connections to properties located within and close by to the area of Part B.

3.3.23. Extra High Voltage (EHV) cables run to the east of the existing carriageway from the southern extent of Part B to the existing junction adjacent to Charlton Mires where it transfers to the west.

MALICIOUS ACTS

3.3.24. The **Preliminary Study Sources Report** (**PSSR**) (refer to **Appendix 11.1, Volume 8** of this ES (**Application Document Reference: TR010041/APP/6.8**)) states that a Pre-Desk Study Assessment (PDSA) prepared by Zetica indicates that there are no readily available records of bombing or other significant military activity within the Study Area.

3.3.25. As part of **Chapter 11: Geology and Soils, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**) a desktop UXO study highlighted the potential for unexploded ordnance from WWII within the vicinity of Eshott Airfield and the Main Compound for Part B.

3.3.26. No acts of terrorism have been recorded within or close to the Part B area.

4. MAJOR EVENTS LONG LIST AND SHORT LIST

4.1.1. As detailed in the Scoping Methodology (refer to **Section 2.2** above), the output from the scoping study was a Major Events Long List and Short List.

4.2. LONG LIST

4.2.1. A copy of the Long List of Major Event types is provided in **Appendix B** of this report. Although some of these Major Events are already considered under other legislative or design requirements, this is not considered to be sufficient reason to automatically eliminate the Major Event from any further consideration.

4.2.2. In accordance with emerging EIA practice, occupational H&S was scoped out of this topic as it is covered by detailed H&S legislation, such as:

a. The Control of Major Accident Hazard Regulations 2015 (**Ref. 26**).
b. The Dangerous Substances and Explosive Atmospheres Regulations 2002 (**Ref. 31**).
c. The Workplace (Health, Safety and Welfare) Regulations 1992 (**Ref. 32**).
d. The Health & Safety At Work Act 1974 (**Ref. 7**), Sections (1) and (2).
e. Management of Health & Safety at Work Regulations 1999 (**Ref. 33**).

4.2.3. Other health issues are covered in **Chapter 12: Population and Human Health**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**).

4.3. SHORT LIST

4.3.1. Those Major Events that were included on the Short List of Major Events and taken forward for further assessment are included in **Table 4-1** below.

Table 4-1 – Short List Potential Major Events

Hazard Group	Hazard Category	Event Type	Location Risk	Construction	Operation	Basis of Decision to Scope In/Out	Scope In?	Potential Receptors
Natural Hazards	Hydrology	Fluvial Flooding	Y	Y	Y	Environment Agency Flood Map for Planning (Rivers and Sea) indicates that the majority of the Order Limits is located in the low-risk Flood Zone 1 where the risk of flooding from fluvial sources is less than 1 in 1,000 (0.1%) in any year. However, there are small areas of Flood Zone 3 located at the southern section of the Study Area to the north west of Denwick and the east of Shipperton Bridge where the risk of flooding from fluvial sources is greater than 1 in 100 (1%) in any year. Therefore, at this site, fluvial flooding can directly cause damage to transport infrastructure, hastening the deterioration of materials.	Y	Aquatic environment and ecological receptors Properties Road Users Public and local community
Natural Hazards	Hydrology	Pluvial Flooding	Y	Y	Y	The Northumberland County Council (NCC) Level 1 Strategic Flood Risk Assessment indicates significant flooding within the North East Northumberland river catchments from pluvial and fluvial sources since 1744. A number of significant flood events are attributed to the River Aln which is located downstream of the Study Area. Surface water flooding is an issue in parts of Northumberland and there is a need for surface water management to reduce the risk of flooding from new development. The Highways England Drainage Data Management System (HADDMS) indicates that the Alnwick to Ellingham section of the existing A1 does not have any documented historical high severity flood events. With regard to future projections, UKCP09 suggests that climate change is projected to lead to wetter winters and drier summers, with more extreme rainfall events. The UKCP09 projections for changes in extreme precipitation in winter in North East England under high emissions scenarios estimates that by the 2050s, precipitation on the wettest day in winter is expected to increase by up to 20% and by the 2080s by up to 40%. The increase in impermeable surfaces as a result of Part B along with the likely increase in rainfall as a result of climate change over the lifetime of Part B would increase flood risk if not mitigated, in addition to, a potential pollution threat to nearby water courses.	Y	Aquatic environment and ecological receptors Properties Road Users Public and local community
Natural Hazards	Hydrology	Groundwater Flooding	Y	Y	N	The Preliminary Environmental Information Report (PEIR) states that groundwater is at 1-5 m below ground level. It also mentions that operation of Part B may result in a change in local drainage patterns due to the installation of a new highways drainage system and that this could result in changes to groundwater levels.	Y	Workers

Hazard Group	Hazard Category	Event Type	Location Risk	Construction	Operation	Basis of Decision to Scope In/Out	Scope In?	Potential Receptors
						During operation of Part B it is assumed that, in designing Part B to applicable standards, receptors would not be put at a greater risk compared to the risk associated with the current route of the A1. However, there is considered to be a greater risk during the construction phase when there would be excavations below groundwater level.		
Technological or Manmade Hazards	Industrial and Urban Accidents	Mines and storage caverns	Y	Y	Y	The Study Area is not affected by recorded underground or opencast mining, nor are there future mining operations planned. Although the route is underlain by coal seams, these have no record of being mined, however, the possibility that there are mine workings within these seams cannot be ruled out. Coal Authority records state that the Main Compound lies within a Coal Authority Coal Mining Reporting Area, but not within a DHRA. The Lionheart Enterprise Park Compound lies within a Coal Authority Coal Mining Reporting Area but the Order Limit do not lie within a DHRA. A DHRA is however shown be present to the south east of the compound site, within the 250 m buffer. This appears to be associated with coal outcrops that are present along Cawledge Burn. The southernmost extent of Part B northwards to Heckley Fence lies within a Coal Authority Coal Mining Reporting Area with several parts of this classified as DHRAs; DHRAs are present within the 250 m buffer related to the access track off the B1340, at and to the north and east of Broom House Farm, to the south and north west of Heckley House, to the north west of Broxfield and to the east of Heckley Fence. The Part B Main Scheme Area from north of Charlton Mires to the northernmost extent of Part B is also located within a Coal Authority Coal Mining Reporting Area; there are two DHRAs located within the 250 m buffer of this part of Part B.	Y	Road users Workers
Technological or Manmade Hazards	Transport accidents	Aviation	Y	Y	N	There have been no major air accidents in the UK since the Kegworth incident in 1989. There is a working airfield (Eshott) located immediately to the south of the Main Compound, which is located to the west of Thirston New Houses, and so workers could be at risk during the construction phase. There is the potential for the compound to have an impact on airfield operations as it is located within the safeguarding zone. The airfield is located 15 km away from the road.	Y	Workers Public and local community
Technological or Manmade Hazards	Utilities failures	Gas	Y	Y	N	Gas transmission pipelines are present within the Order Limits, the responsibilities of which lie with the relevant local operator or company should this infrastructure fail.	Y	Public and local community Workers

Hazard Group	Hazard Category	Event Type	Location Risk	Construction	Operation	Basis of Decision to Scope In/Out	Scope In?	Potential Receptors
						The potential risk of construction-related incidents when undertaking works as part of Part B would be covered by existing legislation could result in loss of supply. No gas use associated with Part B.		
Technological or Manmade Hazards	Engineering accidents and failures	Bridge failure	Y	Y	Y	Part B includes a bridge over the A1 as part of the new Charlton Mires Junction and a new accommodation bridge at the southern end of Part B (Heckley Fence). This would be a new source of risk as currently as there are no bridges over the existing carriage way. These structures have been designed to meet modern safety standards, which reduces their likelihood of future failure.	Y	People Road Users Workers

4.4. MITIGATION MEASURES

4.4.1. Key management and mitigation measures are described in the Risk Record (**Appendix C** of this report). In all cases, compliance with the legal and regulatory requirements described in this section to manage risks to be ALARP must be demonstrated, including the requirement to:

a. Manage all road accident risks in accordance with the A1 in Northumberland Morpeth to Ellingham Safety Plan (**Ref. 16**).
b. Comply with design standards, this would include designing to appropriate environmental parameters (flood, wind, lightning) including climate change. Design standards apply to controls and systems, civil infrastructure, gas pipeline and electrical infrastructure.
c. Co-ordinate between Highways England and its maintenance contractors.

4.5. ASSESSMENT OF POTENTIAL MAJOR EVENTS

POTENTIAL MAJOR RISK EVENTS – CONSTRUCTION PHASE

4.5.1. The ten Major Events to which Part B may be vulnerable during the construction phase and the outcomes of the assessment are summarised in **Table 4-2** below and detailed in the Risk Record (**Appendix C** of this report). Based on the assumptions and mitigation measures put forward by the Topic Specialists in **Technical Chapters 5 to 14** (**Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**), it is considered that they would all be managed to be ALARP.

Table 4-2 – Potential Major Risk Events – Construction Phase

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	ES Topic	Is this As Low As Reasonably Practicable with Existing Mitigation?
1	Natural Hazards: Hydrology	Extreme weather (flood)	Pluvial flooding	Heavy precipitation on Part B which the drainage network cannot cope with risks due blockage, channel roughness, downstream water and exceedance events.	A review of the Environment Agency Flood Risk from Surface Water map indicates that sections of Part B are at high, medium and low risk of flooding from surface water sources. The HADDMS online database indicates that the Alnwick to Ellingham section of the existing A1 has two documented surface water flood events. These are not classified as severe flood events and have a severity index of less than one.	Death or injury to multiple road users	**Chapter 10: Road Drainage and the Water Environment, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)	Y
8	Technological or Manmade Hazards: Industrial and Urban Accidents	Harm to people	Earthworks and construction activities (e.g. overturning of crane or 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 or injury of workers and road users.	Collapse or impact leads to harm to construction and other workers and road users in the vicinity.	**Chapter 12: Population and Human Health**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)	Y
16	Technological or Manmade Hazards: Industrial and Urban Accidents	Major road traffic accident	Ground subsidence leading to damage of roadway or associated infrastructure.	Collapse of carriageway (Rock South Farm Access Road)	Several parts of the Order Limits lie within the Coal Authority Mining Reporting Area with specific sections classified as DHRA. Most of the DHRAs are within the 250 m buffer rather than Part B itself. There are two DHRAs located where construction works would be taking place: Heckley Fence DHRA and the Rock Midstead DHRA. Note: The Rock Midstead DHRA traverses the Rock South Farm Access Road which is proposed to be upgraded via widening to the western edge of the existing track.	Death or injury to multiple road users.	**Chapter 11: Geology and Soils**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)	Y

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	ES Topic	Is this As Low As Reasonably Practicable with Existing Mitigation?
17	Technological or Manmade Hazards: Industrial and Urban Accidents	Fire or explosion or release of harmful gas	Presence of underground intermediate pressure gas pipeline	Release of flammable gas from pipeline	It is proposed to divert 2025 m of intermediate pressure gas main on the west of the A1 from Ch58+200m to Ch58+600m and Ch58+800m and Ch60+300m. Striking of underground services or utilities - when undertaking gas diversion works or from adjacent construction work on the road. Loss of containment during works on the gas pipeline e.g. when connecting the new system to the existing system.	Fire and/or explosion affects neighbouring property or members of the public.	**Chapter 12: Population and Human Health**, **Chapter 11: Geology and Soils**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)	Y
18	Technological or Manmade Hazards: Industrial and Urban Accidents	Fire or explosion or release of harmful gas	Presence of underground intermediate pressure gas pipeline	Release of flammable gas from pipeline	Ground subsidence leading to loss of containment.	Fire and/or explosion affects neighbouring properties or those people in the immediate area.	**Chapter 12: Population and Human Health**, **Chapter 11: Geology and Soils**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)	Y
19	Technological or Manmade Hazards: Transport accidents	Harm to people	Main Compound is located within Eshott Airfield's Safeguarding Zone - possible impacts on airfield operations e.g. compound lighting and other structures, construction equipment such as cranes and piling rigs etc.	Illumination	Air accident causing harm to people.	Death or injury to members of the public or construction workers.	**Chapter 12: Population and Human Health**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)	Y
21	Technological or Manmade Hazards: Industrial and Urban Accidents	Major road traffic accident	Ground subsidence leading to damage of roadway or associated infrastructure.	Collapse of overhead structure onto carriageway. Collapse of carriageway.	Several parts of the Order Limits lie within the Coal Authority Mining Reporting Area with specific sections classified as DHRA. Most of the DHRA's are within the 250 m buffer rather than Part B itself. There are two DHRAs located where construction	Death or injury to multiple road users.	**Chapter 11: Geology and Soils**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)	Y

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	ES Topic	Is this As Low As Reasonably Practicable with Existing Mitigation?
					works would be taking place: Heckley Fence DHRA and the Rock Midstead DHRA.			
22	Technological or Manmade Hazards: Industrial and Urban Accidents	Major Road Traffic Accident Collapse or damage to structure	Transportation of bridge components Phased construction of bridge in immediate proximity of operational public highway	Road users on the existing A1 Falling objects cause road traffic accident	1) Injury to third parties 2) Debris falling on public highway resulting in accident 3) Damage to third party utilities or services located on or near bridges	Death or injury to members of the public, construction workers and Highways England personnel	**Chapter 12: Population and Human Health**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)	Y
24	Natural Hazards: Hydrology	Extreme weather (flood)	Fluvial flooding	The River Aln, Denwick Burn, Kittycarter Burn, White House Burn and Shipperton Burn. Inadequate attenuation.	Part B includes a small section located in close proximity to the medium risk Flood Zone 2 and the high-risk Flood Zone 3; the identified fluvial flood risk is located along Denwick Burn and is associated with the River Aln. Consultation has also highlighted an existing flooding issue regarding fluvial flooding from the tributaries of Kittycarter Burn. Hydraulic modelling has shown existing flood risk extents within the Order Limits associated with White House Burn, Kittycarter Burn and Shipperton Burn.	Death or injury to multiple road users	**Chapter 10: Road Drainage and the Water Environment**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)	Y
25	Technological or Manmade Hazards: Industrial and Urban Accidents	Major Road Traffic Accident Collapse or damage to structure	Transportation of bridge components Phased construction of bridge in immediate proximity of operational public highway	Road users on the existing A1 Falling objects cause road traffic accident	1) Injury to third parties 2) Debris falling on public highway resulting in accident 3) Damage to third party utilities or services located on or near bridge	Death or injury to members of the public, construction workers and Highways England personnel	**Chapter 12: Population and Human Health**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)	Y

POTENTIAL MAJOR RISK EVENTS - OPERATIONAL AND MAINTENANCE PHASES

4.5.2. The seven Major Events to which Part B may be vulnerable during the operation and maintenance phase and the outcomes of the assessment are summarised in **Table 4-3** below and are detailed in the Risk Record (**Appendix C** of this report). Based on the assumptions and mitigation measures put forward by the Topic Specialists (**Technical Chapters 5 to 14, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**), it is considered that they would all be managed to be ALARP.

Table 4-3 – Potential Major Risk Events – Operational and 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 As Low As Reasonably Practicable with Existing Mitigation?
1	Natural Hazards: Hydrology	Extreme weather (flood)	Pluvial flooding	Heavy precipitation on Part B which the drainage network cannot cope with risks due blockage, channel roughness, downstream water and exceedance events.	A review of the Environment Agency Flood Risk from Surface Water map indicates that sections of Part B are at high, medium and low risk of flooding from surface water sources. The HADDMS online database indicates that the Alnwick to Ellingham section of the existing A1 has two documented surface water flood events. These are not classified as severe flood events and have a severity index of less than one.	Death or injury to multiple road users	**Chapter 10: Road Drainage and the Water Environment**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)	Y
16	Technological or Manmade Hazards: Industrial and Urban Accidents	Major road traffic accident	Ground subsidence leading to damage of roadway or associated infrastructure.	Collapse of carriageway (Rock South Farm Access Road)	Several parts of the Order Limits lie within the Coal Authority Mining Reporting Area with specific sections classified as DHRA. Most of the DHRA's are within the 250 m buffer rather than Part B itself. There are two DHRAs located where construction works would be taking place: Heckley Fence DHRA and the Rock Midstead DHRA. Note: The Rock Midstead DHRA traverses the Rock South Farm Access Road which is proposed to be upgraded via widening to the western edge of the existing track.	Death or injury to multiple road users.	**Chapter 11: Geology and Soils**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)	Y
18	Technological or Manmade Hazards: Industrial and Urban Accidents	Fire or explosion or release of harmful gas	Presence of underground intermediate pressure gas pipeline	Release of flammable gas from pipeline	Ground subsidence leading to loss of containment.	Fire or explosion affects neighbouring properties or those people in the immediate area.	**Chapter 11: Geology and Soils**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)	Y

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 As Low As Reasonably Practicable with Existing Mitigation?
21	Technological or Manmade Hazards: Industrial and Urban Accidents	Major road traffic accident	Ground subsidence leading to damage of roadway or associated infrastructure.	Collapse of overhead structure onto carriageway. Collapse of carriageway.	Several parts of the Order Limits lie within the Coal Authority Mining Reporting Area with specific sections classified as DHRA. Most of the DHRAs are within the 250 m buffer rather than Part B itself. There are two DHRAs located where construction works would be taking place: Heckley Fence DHRA and the Rock Midstead DHRA.	Death or injury to multiple road users.	**Chapter 11: Geology and Soils**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)	Y
23	Technological or Manmade Hazards: Transport accidents	Harm to people	Vehicle falling from new bridge.	Road users on the existing and new A1	Vehicle falling from new bridge onto existing A1 road users below.	Death or injury to multiple road users.	**Chapter 12: Population and Human Health**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)	Y
24	Natural Hazards: Hydrology	Extreme weather (flood)	Fluvial flooding	The River Aln, Denwick Burn, Kittycarter Burn, White House Burn and Shipperton Burn. Inadequate attenuation.	Part B includes a small section located in close proximity to the medium risk Flood Zone 2 and the high-risk Flood Zone 3; the identified fluvial flood risk is located along Denwick Burn and is associated with the River Aln. Consultation has also highlighted an existing flooding issue regarding fluvial flooding from the tributaries of Kittycarter Burn. Hydraulic modelling has shown existing flood risk extents within the Order Limits associated with White House Burn, Kittycarter Burn and Shipperton Burn.	Part Bhad identified flooding affecting neighbouring property Death or injury to multiple road users	**Chapter 10: Road Drainage and the Water Environment, Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)	Y
26	Technological or Manmade Hazards: Transport accidents	Harm to people	Vehicle falling from new bridge.	Road users on the existing and new A1	Vehicle falling from new bridge onto existing A1 road users below.	Death or injury to multiple road users.	**Chapter 12: Population and Human Health**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**)	Y

5. CONCLUSIONS

5.1.1. This Report details the expected significant effects resulting from the vulnerability of Part B to the risk of Major Events, taking into account relevant legislation and guidance applicable in England. Where appropriate, this description includes the further mitigation measures required to prevent, reduce or offset any significant negative effects, the preparedness for and proposed response to emergencies, and the expected residual effects after these measures have been employed.

5.1.2. As detailed in the Scoping Methodology (refer to **Section 2.2** above), the output from the scoping study was a Major Events Long List and Short List. Those Major Events that were included on the Short List of Major Events were taken forward for further assessment.

5.1.3. Ten Major Events where identified to which Part B may be vulnerable during the construction phase and seven such events during the operation and maintenance phase. Based on the assumptions and mitigation measures put forward in **Technical Chapters 5 to 14**, **Volume 3** of this ES (**Application Document Reference: TR010041/APP/6.3**), it is anticipated that they would all be managed to be ALARP.

GLOSSARY

The definition of key terms used in this report are provided below. These definitions have been developed by reference to the definitions used in EU and UK legislation and guidance relevant to major accidents or disasters as well as professional judgement based on knowledge and experience of similar schemes in the context of Part B (**Refs. 23, 25, 26, 27, 28, 29, 34, 35, 36, 37** and **38**).

Key Terms and Definitions Relevant to this Report

Term	Definition
Disaster	In the context of Part B, a naturally occurring phenomenon such as an extreme weather event (for example storm, flood, temperature) or ground-related hazard events (for example subsidence, landslide, earthquake) with the potential to cause an event or situation that meets the definition of a Major Accident as defined above.
External Influencing Factor	A factor which occurs beyond the Order Limits that may present a risk to Part B, e.g. if an external disaster occurred (e.g. earthquake, COMAH site major accident) it would increase the risk of serious damage to an environmental receptor associated with Part B.
Hazard	Anything with the potential to cause harm, including ill-health and injury, damage to property or the environment; or a combination of these.
Internal Influencing Factor	A factor which occurs within the Order Limits that may present a risk to Part B.
Major Accident	In the context of Part B, an event that threatens immediate or delayed serious damage to human health, welfare or the environment, and requires the use of resources beyond those of the Applicant or its contractors to respond to the event. Serious damage includes the loss of life or permanent injury and/or permanent or long-lasting damage to an environmental receptor that cannot be restored through minor clean-up and restoration efforts. The significance of this effect takes into account the extent, severity and duration of harm and the sensitivity of the receptor.
Major Event	Combined term used for a Major Accident or Disaster (as defined in this table).
Risk	The likelihood of an impact occurring combined with effect or consequence(s) of the impact on a receptor if it does occur.

Term	Definition
Risk Event	An identified, unplanned event, which is considered relevant to Part B and has the potential to be a Major Accident or Disaster subject to assessment of its potential to result in a significant adverse effect on an environmental receptor.
Vulnerability	In the context of the 2014 EU Directive, the term refers to the 'exposure and resilience' of Part B to the risk of a major accident or disaster. Vulnerability is influenced by sensitivity, adaptive capacity and magnitude of impact.

REFERENCES

Ref. 1 – Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (SI 2017 No. 572)
Ref. 2 – Highways Agency (2008) Design Manual for Roads and Bridges (DMRB) Volume 11 Section 2 Part 5 (HA 205-08) Assessment and Management of Environmental Effects.
Ref. 3 – Directive 2014/52/EU of the European Parliament and of The Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.
Ref. 4 – Institute of Environmental Management and Assessment (IEMA), EIA Quality Mark Article: Assessing Risks of Major Accidents / Disasters in EIA, March 2016.
Ref. 5 –IEMA, EIA Quality Mark Article: What is this MADness? August 2017.
Ref. 6 –IEMA, EIA Quality Mark Webinar: Major Accidents and Natural Disasters in EIA, 13th July 2017.
Ref. 7 – Health and Safety at Work etc. Act 1974 (c. 37) (HSWA)
Ref. 8 – Construction (Design and Management) Regulations 2015 (SI 2015 No. 15) (CDM)
Ref. 9 – Occupier's Liability Act 1984 (c.3)
Ref. 10 – Cabinet Office, National Risk Register of Civil Emergencies, 2017 Edition.
Ref. 11 – International Federation of Red Cross and Red Crescent Societies, Early Warning, Early Action, 2008.
Ref. 12 – The International Disaster Database. Available at: http://www.emdat.be/
Ref. 13 – British Geological Survey Geo Index Onshore. Available at: http://mapapps2.bgs.ac.uk/geoindex/home.html
Ref. 14 – Prevention Web Europe: Tsunamis Hazard Map. Available at: https://www.preventionweb.net/english/professional/maps/v.php?id=3831
Ref. 15 – Met Office (2013) England and Wales drought 2010-2012
Ref. 16 – A1 in Northumberland Morpeth to Ellingham Safety Plan (SGAR3), February 2018, WSP Report: HE551459-WSP-GEN-ZZ-RP-ZS-0173, WSP UK Limited.
Ref. 17 – Defra (2011), Guidelines for Environmental Risk Assessment and Management: Green Leaves III, Cranfield University and Department for Environment, Food and Rural Affairs, November 2011.
Ref. 18 – Department for Transport (2014) National Policy Statement for National Networks. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387222/npsnn-print.pdf Accessed 3 March 2018
Ref. 19 – Environment Agency (January 2012) Yorkshire and North East Region Drought Plan
Ref. 20 – Northumbrian Water Draft Drought Plan 2018, Northumbrian water, August 2017. Available at: https://www.nwl.co.uk/_assets/documents/NW_Draft_Drought_Plan_-_2017_-_Published.pdf
Ref. 21 – Health & Safety Executive's Planning Advice Web App. Available at: https://pa.hsl.gov.uk/

Ref. 22 – Health & Safety Executive's COMAH 2015 Public Information Search, https://notifications.hse.gov.uk/COMAH2015/Search.aspx,
Ref. 23 – SEPA (2016a) CDOIF guideline "Environmental Risk Tolerability for COMAH Establishments" v2. Available at: http://www.sepa.org.uk/media/219154/cdoif_guideline__environmental_risk_assessment_v2.pdf Accessed 3 March 2018
Ref. 24 – The International Standards Organization's ISO 31000: 2009 Risk Management – principles and guidelines.
Ref. 25 – The Seveso III Directive (Directive 2012/18/EU).
Ref. 26 – Control of Major Accident Hazards Regulations 2015 (SI 2015 No. 483) (COMAH)
Ref. 27 – Health and Safety Executive (2015) The Control of Major Accident Hazards Regulations 2015: Guidance on Regulations, L111, Third Edition, June 2015
Ref. 28 –"All Measures Necessary - Environmental Aspects", COMAH CA. Available at: https://www.sepa.org.uk/media/219152/d130416_all-measures-necessary-guidance.pdf Accessed 3 March 2018
Ref. 29 – Major Accident Off-Site Emergency Plan (Management of Waste from Extractive Industries) (England and Wales) Regulations 2009
Ref. 30 – Department of Environment, Food and Rural Affairs (2011) Guidance: Major Accident Off-Site Emergency Plan (Management of Waste from Extractive Industries) (England and Wales) Regulations 2009. Mining Waste Directive: Article 6 Category "A" Waste Facilities. Department of Environment, Food and Rural Affairs, August 2011.
Ref. 31 – The Dangerous Substances and Explosive Atmospheres Regulations 2002 (SI 2002 No. 2776) (DSEAR)
Ref. 32 – The Workplace (Health, Safety and Welfare) Regulations 1992 (SI 1992 No. 3004)
Ref. 33 – Management of Health & Safety at Work Regulations 1999 (SI 1999 No. 3242)
Ref. 34 – Civil Contingencies Act 2004 (c36).
Ref. 35 – HM Government (2013) Emergency Response and Recovery – Non-statutory guidance accompanying the Civil Contingencies Act 2004, Cabinet Office, 28 October 2013.
Ref. 36 – International Federation of Red Cross and Red Crescent Societies, What is a Disaster? (http://www.ifrc.org/en/what-we-do/disaster-management/about-disasters/what-is-a-disaster/)
Ref. 37 – Oxford English Dictionary.
Ref. 38 – Department of the Environment, Transport and the Regions (DETR) (1999), Guidance on the Interpretation of Major Accident to the Environment for the Purposes of the COMAH Regulations, Department of the Environment, Transport and the Regions, 1999.

Appendix A

LEGISLATION AND GUIDANCE SUMMARY

LEGISLATION AND GUIDANCE SUMMARY

LEGISLATION

Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (SI 2017 No. 572)

The objective of these EIA Regulations is to provide a high level of protection of the environment and to help integrate environmental considerations into the preparation of proposals for development to reduce their impact on the environment. The EIA Regulations prohibit the granting of consent for development which is likely to have a significant effect on the environment unless an EIA has been carried out.

The EIA Regulations require:

a. The assessment of the expected significant adverse effects of the proposed scheme on the environment arising from the vulnerability of the proposed scheme to risks of major accidents or disasters that are relevant to the project concerned.
b. A description of the measures envisaged to prevent or mitigate the significant adverse effects of major accidents or disasters on the environment and details of the preparedness for and proposed response to such emergencies.

Health and Safety at Work etc. Act 1974 (c. 37)

The Act provides the framework for the regulation of workplace H&S in the UK. It places general duties on employers, people in control of premises, manufacturers and employees. The overriding principle is that foreseeable risks to persons would be reduced so far as is reasonably practicable and that adequate evidence would be produced to demonstrate that this has been done.

The Act provides a legal framework for the provision of safe plant and equipment and prevention of harm to people from occupational hazards present in a workplace, including emergencies which may affect those offsite, or visiting the site.

Construction (Design and Management) Regulations 2015 (SI 2015 No. 51)

These Regulations place legal duties on almost all parties involved in construction work. The regulations place specific duties on clients, designers and contractors, so that H&S is taken into account throughout the life of a construction project from its inception to its subsequent final demolition and removal. Under the CDM Regulations, designers have to avoid foreseeable risks so far as is reasonably practicable by: eliminating hazards from the construction; cleaning; maintenance; and proposed use and demolition of a structure, reducing risks from any remaining hazard, and giving collective safety measures priority over individual measures.

The Client, Designers and Contractors have to avoid foreseeable risks so far as is reasonably practicable by: eliminating hazards associated with the design, construction, operation and maintenance aspects of Part B. Therefore, the regulations ensure that

mechanisms are in place to continually identify, evaluate and manage safety risks throughout the design, construction and operation phases of Part B. Many of the risks identified and managed out at the design phase also serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the construction, operational and maintenance phases.

Control of Major Accident Hazards Regulations 2015 (SI 2015 No. 483)

The purpose of the COMAH Regulations is to prevent major accidents involving dangerous substances and limit the consequences to people and the environment of any accidents which do occur.

The COMAH Regulations 2015 implement the majority of the Seveso III Directive (2012/18/EU) in Great Britain. There could be COMAH sites close to Part B whose risk profile could be impacted by Part B and/or Part B falling within the Public Information Zone (PIZ) of a site.

Any areas of Part B which fall within the PIZ of a COMAH site would need to ensure the onward communication of emergency information relating the Major Accident Hazard to relevant person, this would be particularly relevant during the construction phase when the transient workforce may spend significant time within a designated COMAH zone.

Health and Safety at Work etc. Act 1974 (c. 37)

The Act sets down the core principles for managing H&S and goal setting duties for employers, employees, the self-employed and those controlling workplaces; including:

a. Securing the health, safety, and welfare of persons at work;
b. Protecting persons other than persons at work against risks to health or safety arising out of or in connection with the activities of persons at work;
c. Controlling the keeping and use of explosive or highly flammable or otherwise dangerous substances, and generally preventing the unlawful acquisition, possession and use of such substances.

Highways England, contractors and sub-contractors have to avoid foreseeable risks so far as is reasonably practicable by: eliminating hazards associated with all work-related activities associated with Part B throughout its lifecycle both to their employees and others arising out of or in connection with the activities of persons at work.

This is particularly relevant during the construction and maintenance phases.

Management of Health and Safety at Work Regulations 1999 (SI 1999 No. 3242)

The Regulations reinforce employer's duties to manage H&S and apply to all work activities. The principal of risk based assessment provides the cornerstone for management of H&S and all employers are required to undertake risk assessments. The regulations require the assessment and management of H&S risks and where required procedures for dealing with emergencies, which would include major accidents.

Many of the risks identified and managed would serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the construction, operational and maintenance phases of Part B.

Occupier's Liability Act 1984 (c.3)

This Act amends the law of England and Wales as to the liability of persons as occupiers of premises for injury suffered by persons other than their visitors.

Provides a legal framework for the prevention of harm to people from occupational safety and health hazards present on premises under the control of the Occupier, including to those visiting the premises.

Part B includes areas of land designated for marshalling of construction resources which attract visitors who could be impacted by Major Events whilst on or crossing those Highways England controlled premises.

The Planning (Hazardous Substances) Regulations 2015 (SI 2015 No. 627)

These regulations transpose the land-use planning requirements of the European Seveso III Directive and relate to the way hazardous substances consents operate, and the way in which the planning system reduces the likelihood and impact of major accidents.

Hazardous Substance Consents (HSC) focus on ensuring the safety of the public around the consented site from potential major accident hazards.

Part B might be impacted by a Major Accident at a HSC site or increase the risk profile of the HSC site.

Pipe-Lines Act 1962 (c. 58)

The purpose of the Act is to ensure the orderly construction of pipelines in such a way as to meet the requirements of the pipeline users, while at the same time minimising disturbance to farmers and land owners by careful planning of routes and by avoiding unnecessary duplication of pipelines. The provisions of the Act are substantially directed towards industrial pipelines except where these are already covered by existing legislation.

Pipelines are divided in to two categories: local pipelines, which are those pipelines not exceeding 10 miles in length, and cross country pipelines, which are those which do exceed 10 miles in length. Section 7(1) of the 1962 Act provides that the construction of a pipeline not exceeding 10 miles in length as an addition to another pipeline is to be deemed to be the construction of a cross country pipeline (and not of a local pipeline) if the length of the two exceeds 10 miles. The Act provides that cross country pipelines may not be constructed without authorisation of the Secretary of State.

The Act requires minimising disturbance to other buried utility providers and land/property owners by careful planning of routes for the Gas Pipeline in Part B.

The Pipelines Safety Regulations 1996 (SI 1996 No. 825)

The purpose of these Regulations is to ensure that pipelines are designed, constructed and operated properly to ensure their integrity and reduce environmental risks.

The Regulations require the preparation of a Safety Report which demonstrates that the risks associated with the Gas Pipeline passing under Part B and which is to be modified are ALARP and prevent or minimise a potential major accident prior to construction and operation.

Many of the risks identified and managed out at the design and pre-construction phases also serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the construction, operational and maintenance phases of Part B.

Gas Safety (Management) Regulations 1996 (as amended) (SI 1996 No. 551)

These Regulations provide for the preparation and acceptance of safety cases in respect of the conveyance of gas in a network and impose requirements in respect of gas escapes and the composition and pressure of gas.

The Regulations require the preparation of a Safety Report which demonstrates that the risks associated with the Gas Pipeline passing under Part B and which is to be modified are ALARP and prevent or minimise a potential major accident prior to construction and operation.

Many of the risks identified and managed out at the design, pre-construction phases also serve to eliminate or reduce the risk of a major accident (and therefore environmental consequence) occurring during the construction, operational and maintenance phases of Part B.

GUIDANCE

Defra (2011) 'Green Leaves III' Guidelines for Environmental Risk Assessment and Management

These guidelines provide generic guidance for the assessment and management of environmental risks. A cyclical framework for risk management is provided which identifies four main components of risk assessment:

a. Formulating the problem;
b. Carrying out an assessment of the risk;
c. Identifying and appraising the management options available; and
d. Addressing the risk with a risk management strategy.

A source-pathway-receptor model is suggested as a tool to assist in risk screening and an example is provided of applying the following filters to prioritise significant hazards for further investigation:

a. The plausibility of linkages between the source of a hazard and a receptor;

b. The relative potency of a hazard, availability of a pathway, or vulnerability of a receptor;
c. The likelihood of an event, on the basis of historic occurrence or of changed circumstances; or
d. A view on the performance of current risk management measures that, if they were to fail, may increase the potential for future harm.

Chemical and Downstream Oil Industries Forum, (2013), Guideline – Environmental Risk Tolerability for COMAH Establishments

These guidelines provide a common screening methodology for carrying out an environmental risk assessment under the COMAH Regulations. Amongst other things, the guidance:

a. defines the types of harm that should be considered in an environmental risk assessment, and how the harm should be characterised for the assessment;
b. defines the risk criteria to be used in assessing tolerability of the environmental risk from an establishment, and where appropriate, individual scenarios; and
c. explains how risks may be evaluated.

The guidelines present a series of thresholds that can be used to 'screen' the potential for a Major Accident to the Environment (MATTE) to relevant environmental receptors. The thresholds have been developed based on the criteria for reporting a major accident to the European Commission defined in the Seveso III Directive and COMAH Regulations, and to guidance on MATTE issued by the then Department of the Environment, Transport and the Regions in 1999. The thresholds are presented in two dimensions, namely (i) extent and severity and (ii) duration of harm; and thresholds for both dimensions must be exceeded for the scenario to be considered a potential MATTE.

The International Standards Organization's ISO 31000: 2009 Risk Management – principles and guidelines

This guideline identifies a number of principles that need to be satisfied to make risk management effective. If the standards are adopted and applied the management of any risk should help minimise losses, improve resilience, improve controls and improve the identification of opportunities and threats.

The ISO standard states that when defining risk criteria, the following factors should be considered:

a. the nature and types of causes and consequences that can occur and how they will be measured;
b. how likelihood will be defined;
c. the timeframe(s) of the likelihood or consequence(s);
d. how the level of risk is to be determined;
e. the views of stakeholders;
f. the level at which risk becomes acceptable or tolerable; and

g. whether combinations of multiple risks should be taken into account and, if so, how and which combinations should be considered.

Appendix B

SCOPING LONG LIST

Hazard Group	Hazard Category	Event Type	Location Risk	Phases which Exacerbate Vulnerability	Potential Receptors	Basis of Decision to Scope In/Out	Scope In?
Natural Hazards	Geophysical	Earthquakes	N	N/A	N/A	Do not occur in Britain of a sufficient intensity owing to the motion of the Earth's tectonic plates causing regional compression. In addition, uplift from the melting of the ice sheets that covered many parts of Britain thousands of years ago can also cause movement. The BGS acknowledges that on average, a magnitude four earthquake happens in Britain roughly every two years and a magnitude 5 earthquake occurs around every 10 to 20 years. As such the Cabinet Office National Risk Register of Civil Emergencies states that "*Earthquakes in the UK are moderately frequent but rarely result in large amounts of damage. An earthquake of sufficient intensity (determined on the basis of the earthquake's local effect on people and the environment) to inflict severe damage is unlikely*". Part B is not in or close to an active area.	N
Natural Hazards	Geophysical	Volcanic Activity	N	N/A	N/A	Part B is not in an active area and highly unlikely that an ash cloud could significantly impact on any aspect of Part B.	N
Natural Hazards	Geophysical	Landslides	N	C, O	Workers Road Users	Historical landslides have not been recorded within the Order Limits (**Ref. 14**). Part B involves the formation of cuttings and embankments. In particular, steep embankments would be located at the proposed Charlton Mires Junction and Heckley Fence Accommodation Overbridge, with smaller embankments along various sections of the new carriageway. Considered by the Geotech and highway engineering teams as a fundamental part of Part B's design-development. In designing Part B to applicable standards, resources and receptors would not be put at a greater risk as a consequence of Part B.	N
Natural Hazards	Geophysical	Sinkholes	N	N/A	N/A	This is likely to be covered in the geotechnical design, and there are no examples of roads that have been affected by sinkholes in the locality to warrant taking this event forward.	N
Natural Hazards	Geophysical	Tsunamis	N	N/A	N/A	Part B is located inland, outside a tsunamis risk zone.	N
Natural Hazards	Hydrology	Coastal Flooding	N	N/A	N/A	Part B is located inland, outside a coastal area.	N
Natural Hazards	Hydrology	Fluvial Flooding	Y	C, O	Aquatic environment and ecological receptors Properties Road Users Public and	Environment Agency Flood Map for Planning (Rivers and Sea) indicates that the majority of the Order Limits is located in the low-risk Flood Zone 1 where the risk of flooding from fluvial sources is less than 1 in 1,000 (0.1%) in any year. However, there are small areas of Flood Zone 3 located at the southern section of the Study Area to the north west of Denwick and the east of Shipperton Bridge where the risk of flooding from fluvial sources is greater than 1 in 100 (1%) in any year. Therefore, at this site, fluvial flooding can directly cause damage to transport infrastructure, hastening the deterioration of materials.	Y

Hazard Group	Hazard Category	Event Type	Location Risk	Phases which Exacerbate Vulnerability	Potential Receptors	Basis of Decision to Scope In/Out	Scope In?
					local community		
Natural Hazards	Hydrology	Pluvial (Surface Water) Flooding	Y	C, O	Aquatic environment and ecological receptors Properties Road Users Public and local community	The NCC Level 1 Strategic Flood Risk Assessment indicates significant flooding within the North East Northumberland river catchments from pluvial and fluvial sources since 1744. A number of significant flood events are attributed to the River Aln which is located downstream of the Study Area. Surface water flooding is an issue in parts of Northumberland and there is a need for surface water management to reduce the risk of flooding from new development. The HADDMS indicates that the Alnwick to Ellingham section of the existing A1 does not have any documented historical high severity flood events. With regard to future projections, UKCP09 suggests that climate change is projected to lead to wetter winters and drier summers, with more extreme rainfall events. The UKCP09 projections for changes in extreme precipitation in winter in North East England under High emissions scenarios estimates that by the 2050s, precipitation on the wettest day in winter is expected to increase by up to 20%, by 2080s by up to 40%. The increase in impermeable surfaces as a result of Part B along with the likely increase in rainfall as a result of climate change over the lifetime of Part B would increase flood risk if not mitigated in addition to a potential pollution threat to nearby water courses.	Y
Natural Hazards	Hydrology	Ground Water Flooding	Y	C	Workers	The PEIR states that groundwater is at 1-5 m below ground level. It also mentions that operation of Part B may result in a change in local drainage patterns due to the installation of a new highways drainage system and that this could result in changes to groundwater levels. During operation of Part B it is assumed that, in designing Part B to applicable standards, receptors would not be put at a greater risk compared to the risk associated with the current route of the A1. However, there is considered to be a greater risk during the construction phase when there would be excavations below groundwater level.	Y
Natural Hazards	Hydrology	Avalanches	N	N/A	N/A	Not considered relevant given the geographical location of Part B. Part B's topography is relatively flat and therefore an avalanche would not occur.	N
Natural Hazards	Climatological and Metrological	Cyclones, hurricanes, typhoons, storms and gales	Y	C, O	Property Workers Road Users	Cyclones, hurricanes and typhoons do not occur in the UK. The winter of 2015/2016 was the second wettest winter on record and a series of storms (including 'Desmond' and 'Eva') resulted in heavy and sustained rainfall. 17,600 UK properties were flooded and several bridges collapsed, disrupting access to and from local communities.	N

Hazard Group	Hazard Category	Event Type	Location Risk	Phases which Exacerbate Vulnerability	Potential Receptors	Basis of Decision to Scope In/Out	Scope In?
						Storms and gales could result in damage to highway infrastructure and could affect journeys made by road users; however, the risk is no different to similar roads or road users in the locality.	
Natural Hazards	Climatological and Metrological	Thunderstorms	Y	C, O	Workers	This type of event could result in lightning strikes to temporary elevated structures during construction (e.g. tower cranes) and new elevated structures (such as bridges) introduced as part of Part B; however, the risk is no different to similar roads or road users in the locality. Specific measures are therefore not considered to be required as part of Part B.	N
Natural Hazards	Climatological and Metrological	Wave surges	N	N/A	N/A	Part B is located sufficiently inland, and therefore is not subject to wave surges.	N
Natural Hazards	Climatological and Metrological	Extreme temperatures: Heatwaves Low (sub-zero) temperatures and heavy snow	Y	N/A	N/A	This type of event could give rise to changes in climatic conditions, with road infrastructure exposed to greater heat intensity and exposure to sunlight. Heavy snow could cause workers and road users to be trapped on the highway. In August 2003 a UK heatwave lasted 10 days and resulted in over 2,000 deaths. Temperatures reached what was then a record 38.5°C in Faversham, England. High temperature records are now being broken with increasing frequency. The most widespread and prolonged low temperatures and heavy snow in recent years occurred from December 2009 to January 2010. Daytime temperatures were mostly sub-zero across the UK. Between 1981 and 2010 there have been 2087 days with a maximum minimum temperature below zero degrees Celsius. Between 1981 and 2010 there were 602 days with snow lying at 0900w. However, the risk is no different to similar roads or road users in the locality. Specific measures are therefore not considered to be required as part of Part B.	N
Natural Hazards	Climatological and Metrological	Droughts	Y	C, O	Aquatic environment and ecological receptors People Properties Workers Road users	Over the past 40 years or so England has experienced five long-duration droughts and two shorter periods of drought (**Ref. 11** and **16**). Potable water for the area of Part B is supplied from an abstraction on the River Coquet, an impounding reservoir and treatment works and from rural springs and treatment works. These are linked to the Tyne system with a potable water main (**Ref. 21**). There are also a number of Secondary Aquifers, such as the underlying alluvium and glaciofluvial deposits, which are capable of supporting water supplies at a local scale. Given the rural nature of the County both the Principal and Secondary Aquifers support a significant number of private water supplies. It is important that these water resources are protected.	N

Hazard Group	Hazard Category	Event Type	Location Risk	Phases which Exacerbate Vulnerability	Potential Receptors	Basis of Decision to Scope In/Out	Scope In?
						However, there are no records of licensed groundwater abstraction points within the Study Area. The River Coquet has been identified as experiencing some water resource availability issues. However, it is stated in the Local Drought Plan that it is not anticipated that there would be a problem maintaining supplies in the Tyne Operational Area (in which Part B is located) during a drought (**Ref.21**). Prolonged periods of drought can also impact road infrastructure as drying out and cracking of soils may affect structural stability and prolonged dry periods can lead to cracking of surfaces and more rapid deterioration of materials. Decreased rainfall combined with an increase in the average temperature can also increase subsidence, affecting the stability of the road infrastructure, including pavements and hard surfaces. Part B should not be vulnerable to drought as water is not an essential service during the construction, use or maintenance phases. The design of the sub-structure and bridges would be resilient to ground shrinkage and should remain in the design risk register until designed out.	
Natural Hazards	Climatological and Metrological	Severe Space Weather: Solar Flares	N	N/A	N/A	Solar flare events are known to interrupt radio and other electronic communications. Records from solar storms in 1921 and 1960 describe widespread radio disruption and impacts on railway signalling and switching systems. There is no increased reliance on roadside technology therefore Part B is no more vulnerable than the existing route.	N
Natural Hazards	Climatological and Metrological	Severe Space Weather: Solar Energetic Particles	N	N/A	N/A	Solar energetic particles which cause solar radiation storms, but only in outer space, so this Major Event type can be scoped out.	N
Natural Hazards	Climatological and Metrological	Severe Space Weather: Coronal mass ejections	N	N/A	N/A	Coronal mass ejections (CME) cause geomagnetic storms. The geomagnetic storm in 2003 caused the UK aviation sector to lose some GPS functions for a day, however no known significant impact on road users or infrastructure.	N
Natural Hazards	Climatological and Metrological	Fog	N	N/A	N/A	Fog is one of the most common weather conditions in the UK, particularly throughout autumn and winter. Severe disruption to transport occurs when the visibility falls below 50 m over a wide area. However, the risk for Part B should be no higher than the current route. Collision data over the period 2010-2015 showed there to be no accidents where fog was a contributory factor.	N
Natural Hazards	Climatological and Metrological	Wildfires: Forest fire, Bush/brush, pasture	Y	C, O	Aquatic environment and	In April and May 2011, numerous wildfires broke out across the UK after unusually hot and dry weather. England received only 21% of its usual rainfall for April 2011.	N

Hazard Group	Hazard Category	Event Type	Location Risk	Phases which Exacerbate Vulnerability	Potential Receptors	Basis of Decision to Scope In/Out	Scope In?
					ecological receptors Properties Workers Road users	Vegetation within 500 m of Part B includes arable farmland, woodland, scrub and dry heath which could be at risk of wildfire events during hot, dry periods or fires initiated by construction related activities. During construction, standard control measures would be implemented by the main contractor to manage the risk of fire. During operation however, the risk is no different to similar roads or road users in the locality. Specific measures are therefore not considered to be required as part of Part B.	
Natural Hazards	Climatological and Metrological	Poor Air Quality	Y	C, O	Ecological receptors People Workers Road users	In 2006, the UK experienced two periods of extended hot weather with associated elevated ozone and harmful airborne particles. In the spring of 2015, two particle pollution episodes caused widespread poor air quality throughout the UK, with multiple areas measuring 'High' on the Daily Air Quality Index and resulted in around 1,100 deaths due to exacerbation of pre-existing ill-health conditions. Summer 2015 also contained two elevated ozone episodes (**Ref. 11**). Construction: Construction effects would be temporary for the duration of the construction phase. A review of construction traffic has determined that potential construction traffic impacts on air pollutants could be scoped out of the EIA. Increased dust emissions from earthworks and general construction activities could lead to potential loss of amenity at sensitive receptors. However, during construction, standard control measures would be implemented by the main contractor to manage the risk of dust emissions. Operation: Part B has the potential to cause a change in concentrations of NO_2, PM_{10} and $PM_{2.5}$ through changes to vehicle emission rates as a result of traffic re-routing and changes to fleet mix and speeds. However, modelling shows that concentration changes for PM are imperceptible. Part B is expected to result in both positive and adverse changes to emissions of NO_2 at certain receptors due to changes in exhaust emissions from road traffic along the A1 and linked roads, e.g. B6347 and B6341. However, with background concentrations well below the objective, pollutant concentrations would be below the assessment thresholds at all receptors. Increased exhaust emissions could also generate a potential long-term increase in nitrogen deposition on nearby sensitive designated ecological sites, as a result of increased traffic flows. However, there are no ecologically designated sites, areas or features within 200 m of the Order Limits. Following implementation of appropriate mitigation measures, no significant residual air quality effects are anticipated during construction and operation of Part B.	N
Natural Hazards	Biological	Disease epidemics: Viral	N	N/A	N/A	Part B is located in a developed country where the population is in general good health. Furthermore, the use of Part B (highway) is not going to give	N

Hazard Group	Hazard Category	Event Type	Location Risk	Phases which Exacerbate Vulnerability	Potential Receptors	Basis of Decision to Scope In/Out	Scope In?
		Bacterial Parasitic Fungal Prion				rise to any disease epidemics. Public Health England, the executive agency of the Department of Health is responsible for protecting the nation from public health hazards, preparing for and responding to public health emergencies. One of Public Health England's functions is to protect the public from infectious disease outbreaks and the Agency has produced a document providing operational guidance for the management of outbreaks of communicable disease, 'Communicable Disease Outbreak management: Operational Guidance'.	
Natural Hazards	Biological	Animal Diseases: Zoonotic: Avian influenza West Nile virus Rabies Non-zoonotic: Foot and mouth. Swine fever	N	N/A	N/A	Low and highly pathogenic avian influenza has been recorded in poultry in the UK several times in the last 10 years, most recently in the winter of 2016/17, although with no human cases reported. There was a devastating foot and mouth outbreak in 2001 (**Ref.11**). This has been scoped out as the use of Part B (highway) is not going to be the source of any disease epidemics and spread would be controlled through containment of infected animals including prohibition of transportation.	N
Natural Hazards	Biological	Plants	N	C	Aquatic and ecological receptors People Workers	A bespoke invasive and dangerous species survey has not been undertaken for Part B; however, no dangerous or regulated plants have been identified in the Order Limits during the Phase 1 habitats survey. This does not specifically preclude the absence of invasive or dangerous species, but standard control measures would be implemented by the main contractor during construction to handle and dispose of any diseased plants or injurious weeds, and to prevent their spread.	N
Technological or Manmade Hazards	Societal	Extensive public demonstrations which could lead to violence and loss of life.	N	N/A	N/A	Part B is located in a developed country that has steady, yet small population growth. England is politically stable with no direct border with countries experiencing conflicts. Part B is not considered highly controversial and should not lead to high profile public demonstrations	N
Technological or Manmade Hazards	Societal	Widespread damage to societies and economies.	N	N/A	N/A	Part B is located in a developed country that has steady, yet small population growth. England is politically stable with no direct border with countries experiencing conflicts. No large scale diversions affecting large numbers of people.	N
Technological or Manmade Hazards	Societal	The need for large-scale multi-faceted humanitarian assistance.	N	N/A	N/A	Part B is located in a developed country that has steady, yet small population growth. England is politically stable with no direct border with countries experiencing conflicts.	N
Technological or Manmade Hazards	Societal	The hindrance or prevention of humanitarian assistance by	N	N/A	N/A	Part B is located in a developed country that has steady, yet small population growth. England is politically stable with no direct border with countries experiencing conflicts.	N

Hazard Group	Hazard Category	Event Type	Location Risk	Phases which Exacerbate Vulnerability	Potential Receptors	Basis of Decision to Scope In/Out	Scope In?
		political and military constraints					
Technological or Manmade Hazards	Societal	Significant security risks for humanitarian relief workers in some areas.	N	N/A	N/A	Part B is located in a developed country that has steady, yet small population growth. England is politically stable with no direct border with countries experiencing conflicts.	N
Technological or Manmade Hazards	Societal	Famine	N	N/A	N/A	Part B is located in a developed country that produces its own crops and imports food. It is politically stable and not subject to hyperinflation and therefore food is available, whether produced within the UK or imported. Famine is also not relevant to the use of Part B (highway).	N
Technological or Manmade Hazards	Societal	Displaced population	N	N/A	N/A	There would be no significant displacement of populations as part of Part B. As part of the construction works, two residential properties would be demolished, to accommodate the proposed Charlton Mires Junction.	N
Technological or Manmade Hazards	Industrial and Urban Accidents	Major Accident Hazard Chemical sites	N	N/A	N/A	There are no Control of Major Accident Hazard (COMAH) sites within a 5 km corridor along Part B.	N
Technological or Manmade Hazards	Industrial and Urban Accidents	Major Accident Hazard Pipelines	N	N/A	N/A	Part B does not intersect a pipeline or hazard zone.	N
Technological or Manmade Hazards	Industrial and Urban Accidents	Nuclear	N	N/A	N/A	Nuclear sites are designed, built and operated so that the chance of accidental releases of radiological material in the UK is extremely low. Last historical major accident in the UK was Windscale in 1957. (**Ref.11**) No nuclear sites within a 5 km corridor along Part B.	N
Technological or Manmade Hazards	Industrial and Urban Accidents	Fuel storage	Y	C	Workers People	In December 2005, Europe's largest peacetime fire occurred at the Buncefield Oil Storage Terminal in Hemel Hempstead, England. The surrounding area was temporarily evacuated, and some local businesses experienced long-term disruption to operations. There are no fuel storage sites within the Study Area.	N
Technological or Manmade Hazards	Industrial and Urban Accidents	Dam breaches	N	N/A	N/A	Dam breaches in the UK are rare; the last major breach was at the Cwm Eigiau dam in 1925. Environment Agency Flood Risk from Reservoirs map indicates that there is no risk of flooding from the potential failure of reservoirs. There is an unnamed covered reservoir located approximately 0.1 km to the west of the existing A1 near Craggy Wood. Although the reservoir is not visible on satellite imagery, due to the spatial constraints around the site it is likely that the reservoir is small in size. As a result, it is assumed that	N

Hazard Group	Hazard Category	Event Type	Location Risk	Phases which Exacerbate Vulnerability	Potential Receptors	Basis of Decision to Scope In/Out	Scope In?
						there is no risk associated with the potential failure of the reservoir to Part B.	
Technological or Manmade Hazards	Industrial and Urban Accidents	Mines and storage caverns	Y	C, O	Road users Workers	The Study Area is not affected by recorded underground or opencast mining, nor are there future mining operations planned. Although the route is underlain by coal seams, these have no record of being mined, however, the possibility that there are mine workings within these seams cannot be ruled out. Coal Authority records state that the Main Compound lies within a Coal Authority Coal Mining Reporting Area, but not within a DHRA. The Lionheart Enterprise Park Compound lies within a Coal Authority Coal Mining Reporting Area, but the Order Limits do not lie within a DHRA. A DHRA is however shown be present to the south east of the compound site, within the 250 m buffer. This appears to be associated with coal outcrops that are present along Cawledge Burn. The southernmost extent of Part B northwards to Heckley Fence lies within a Coal Authority Coal Mining Reporting Area with several parts of this classified as DHRAs; DHRAs are present within the 250 m buffer related to the access track off the B1340, at and to the north and east of Broom House Farm, to the south and north west of Heckley House, to the north west of Broxfield and to the east of Heckley Fence. The Part B Main Scheme Area from north of Charlton Mires to the northernmost extent of Part B is also located within a Coal Authority Coal Mining Reporting Area; there are two DHRAs located within the 250 m buffer of this part of Part B.	Y
Technological or Manmade Hazards	Industrial and Urban Accidents	Fires	Y	C	Workers	Fires could be initiated by construction related activities which impact areas adjacent to the construction activities. During construction, standard control measures would be implemented by the main contractor to manage the risk of fire. There is a working airfield (Eshott Airfield) with fuel storage located immediately to the south of the Main Compound which is located to the west of Thirston New Houses. However, the airfield is located 15 km away from the road and therefore other people are unlikely to be impacted.	N
Technological or Manmade Hazards	Transport accidents	Road	Y	C, O	Aquatic environment and ecological receptors Workers Road users	Significant transport accidents occur across the UK on a daily basis, mainly on roads, and involving private and commercial vehicles. During construction there would be an increase in heavy construction plant and equipment on the local road network which may increase the risk of accidents. However, the new road is being constructed off-route so should not have a significant impact on the traffic on the existing carriageway. Part B has been designed to achieve a reduction in existing accident rates on the road network, and to take account of any accidental spillages	N

Hazard Group	Hazard Category	Event Type	Location Risk	Phases which Exacerbate Vulnerability	Potential Receptors	Basis of Decision to Scope In/Out	Scope In?
						through modern drainage and treatment systems. The environmental risks posed by spillages of hazardous loads as a result of road accidents has been considered within the ES. Part B has been designed to take account of any key safety challenges identified in the road's Safety Plan Report, including any issues which were identified during Part A section of road.	
Technological or Manmade Hazards	Transport accidents	Rail	N	N/A	N/A	There are no railways within the Part B area. The East Coast Main Line railway is located at a distance greater than 3 km to the east of Part B.	N
Technological or Manmade Hazards	Transport accidents	Waterways	N	N/A	N/A	There are none located in the Study Area used for significant transport by water. No historical evidence of waterway accidents impacting the road network.	N
Technological or Manmade Hazards	Transport accidents	Aviation	Y	C	Workers	There have been no major air accidents in the UK since the Kegworth incident in 1989. There is a working airfield (Eshott) located immediately to the south of the Main Compound, which is located to the west of Thirston New Houses, and so workers could be at risk during the construction phase. The airfield is located 15 km away from the road. Aviation incidents are considered unlikely to impact the road itself and so no other receptors are identified to be at risk.	N
Technological or Manmade Hazards	Pollution accidents	Air	Y	C, O	People Road users	Construction activities may cause dust emissions which may contribute to poor air quality albeit on a temporary basis. Use of fossil fuelled mobile plant and equipment during the construction phase. However, emissions from mobile plant and equipment covered under H&S and environmental legislation. Emissions associated with vehicles travelling on new and improved sections of highway proposed as part of Part B may contribute to events associated with poor air quality. The potential for this event has been considered in detail as part of the EIA, and it is therefore not considered a requirement to evaluate this further.	N
Technological or Manmade Hazards	Pollution accidents	Land	Y	C, O	Ecological receptors Public and local community	During construction there may be an increased risk of leaks and spillages of hazardous materials associated with the construction activities. During construction, standard control measures would be implemented by the main contractor to manage the risk of spillages and leaks. Part B has been designed to achieve a reduction in existing accident rates on the road network. The environmental risks posed by spillages of hazardous loads as a result	N

Hazard Group	Hazard Category	Event Type	Location Risk	Phases which Exacerbate Vulnerability	Potential Receptors	Basis of Decision to Scope In/Out	Scope In?
						of road accidents has been considered within the ES. Therefore it is not considered a requirement to evaluate this further.	
Technological or Manmade Hazards	Pollution accidents	Water	Y	C, O	Public and local community Water environment	There are a number of Secondary Aquifers, such as the underlying alluvium and glaciofluvial deposits, which are capable of supporting water supplies at a local scale. Given the rural nature of the County both the Principal and Secondary Aquifers support a significant number of private water supplies. It is important that these water resources are protected. However, there are no records of licensed groundwater abstraction points within the Study Area. There are 16 watercourses within 0.5 km of Part B. During construction there may be an increased risk of leaks and spillages of hazardous materials associated with the construction activities. During construction, standard control measures would be implemented by the main contractor to manage the risk of spillages and leaks. Part B has been designed to achieve a reduction in existing accident rates on the road network. The environmental risks posed by spillages of hazardous loads as a result of road accidents has been considered within the ES. Therefore it is not considered a requirement to evaluate this further.	N
Technological or Manmade Hazards	Utilities failures	Electricity	Y	C	Public and local community Workers	Instances of electricity failure (also referred to as power loss or blackout) can be caused by a number of things, such as severe weather (e.g. very strong winds, lightning and flooding) which damage the distribution network. These tend to be mainly specific place, local (e.g. metropolitan area) and less frequently regional (e.g. North East) as a result of severe winter storms and consequent damage to the distribution overhead line network. Underground and above-ground electrical transmission lines (including an extra high voltage cable from Middlemoor Wind Farm) are present across the Order Limits, the responsibilities of which lie with the relevant local operator or company should this infrastructure fail. Although the wind farm is located on the west, the cable runs to the east of the existing carriageway from the southern extent of Part B up to the existing junction adjacent to Charlton Mires where it transfers to the west. Information regarding diversion works has been considered in the ES. The potential risk of construction-related incidents when undertaking diversion works as part of Part B would be covered by existing legislation.”	N
Technological or Manmade Hazards	Utilities failures	Gas	Y	C	Public and local	Gas transmission pipelines are present within the Order Limits, the responsibilities of which lie with the relevant local operator or company should this infrastructure fail.	Y

Hazard Group	Hazard Category	Event Type	Location Risk	Phases which Exacerbate Vulnerability	Potential Receptors	Basis of Decision to Scope In/Out	Scope In?
					community Workers	No gas use associated with Part B. The potential risk of construction-related incidents when undertaking works as part of Part B could result in loss of supply.	
Technological or Manmade Hazards	Utilities failures	Water supply	N	N/A	N/A	The Kielder Water Resource Zone serves the vast majority of Northumberland. Most development coming forward in this zone would be capable of being supplied without problem, although, within the area, the Rivers Coquet and Font have been identified as experiencing some water resource availability issues. No water use associated with Part B during its operation and relatively low use during construction which could be addressed by tankering in supplies if required. There is a Northumbrian Water Mains within the Order Limits which would need to be diverted. It is possible that this could be damaged during the construction or diversion works, which would interrupt water supply, however, this would only temporarily impact the local area.	N
Technological or Manmade Hazards	Utilities failures	Sewage system	N	N/A	N/A	No use of the sewage system associated with Part B. During construction phase temporary portable systems would be in place covered by H&S welfare requirements.	N
Technological or Manmade Hazards	Malicious Attacks	Unexploded ordnance	Y	C	Property Public and local community Workers	A low potential exists for encountering unexploded ordnance during construction of Part B. Measures would be undertaken during construction to brief operatives to raise awareness of this issue, and to define appropriate response strategies should this be discovered during the works. There would be a limited risk of unexploded ordnance affecting Part B, once operational but no greater than similar schemes.	N
Technological or Manmade Hazards	Malicious Attacks	Attacks Chemical Biological Radiological Nuclear	N	N/A	N/A	Extremists remain interested in Chemical, Biological, Radiological and Nuclear materials, however alternative methods of attack such as employing firearms or conventional explosive devices remain far more likely. Historical use has been in closed densely occupied structures (underground, buildings) or targeted at specific individuals. Part B is unlikely to be a target for this type of event due to the low number of exposed targets.	N
Technological or Manmade Hazards	Malicious Attacks	Transport systems	N	N/A	N/A	Potential systems would include (but are not limited to) railways, buses, passenger ferries, cargo vessels and aircraft. Part B is unlikely to be a target for this type of event due to the low number of exposed targets.	N

Hazard Group	Hazard Category	Event Type	Location Risk	Phases which Exacerbate Vulnerability	Potential Receptors	Basis of Decision to Scope In/Out	Scope In?
						Furthermore, Part B is not located within a built up area and does not include particular features, which are likely to be subject to significant vandalism.	
Technological or Manmade Hazards	Malicious Attacks	Crowded places	N	N/A	N/A	Part B does not fall within the definition of a crowed place, i.e. pedestrian routes and other thoroughfares as well as sports arenas, retail outlets and entertainment spaces. Part B is unlikely to be a target for this type of event due to the low number of exposed targets.	N
Technological or Manmade Hazards	Malicious Attacks	Cyber	N	N/A	N/A	Cyber-attacks occur almost constantly on key national and commercial electronic information, control systems and digital industries. The increasing reliance on roadside technology could render Part B more vulnerable to a cyber-attack. Technology is not proposed to be installed as part of Part B along the route (gantries and overhead signage). There are two existing traffic monitoring units; it is currently recommended for these to be replaced with TMUs of current standards or these may be decommissioned and not replaced.	N
Technological or Manmade Hazards	Malicious Attacks	Infrastructure	N	N/A	N/A	Terrorists in the UK have previously attacked, or planned to attack, national infrastructure. Attempts were made to attack electricity substations in the 1990s. These attacks resulted in significant damage and disruption but relatively few casualties. Part B would have minimal impact on local energy infrastructure or be considered a high profile target.	N
Technological or Manmade Hazards	Engineering accidents and failures	Bridge failure	Y	C, O	People Road Users Workers	Part B includes a bridge over the A1 as part of the new Charlton Mires Junction and a new accommodation bridge at the southern end of Part B (Heckley Fence). This would be a new source of risk as currently there are no bridges over the existing carriage way. These structures have been designed to meet modern safety standards, which reduces their likelihood of future failure.	Y
Technological or Manmade Hazards	Engineering accidents and failures	Flood defence failure	Y	C, O	People Property Road users Workers	The Study Area associated with Part B does not benefit from flood defences or flood storage areas. The design of Part B has been developed to include allowances for future climate change predictions that could result in flooding. The potential risk of breach events is considered in the ES.	N
Technological or Manmade Hazards	Engineering accidents and failures	Mast and tower collapse	Y	C, O	Road users Workers	There is an existing telecommunication mast located to the north of Black Plantation. However, this does not need to be relocated as part of Part B. Part B is no more vulnerable to the risk of mast and tower collapse than the existing route.	N

Hazard Group	Hazard Category	Event Type	Location Risk	Phases which Exacerbate Vulnerability	Potential Receptors	Basis of Decision to Scope In/Out	Scope In?
Technological or Manmade Hazards	Engineering accidents and failures	Property or bridge demolition accidents	Y	C	Workers Road Users	Part B involves demolition works to take down a very small number of buildings and structures. As part of the construction works, two residential properties would be demolished to accommodate the proposed Charlton Mires Junction. The risks of accidents occurring during these works would be taken into account by the main contractor and considered as part of their detailed methodology and risk assessments in advance of these works required under CDM. Surveys would be undertaken prior to the demolition of properties and structures to confirm whether any potentially harmful substances (e.g. asbestos) are present, and to determine the risk to people. There are no other residential properties in close proximity and these two properties sit back from the road.	N
Technological or Manmade Hazards	Engineering accidents and failures	Tunnel failure or fire	N	N/A	N/A	There are no tunnel structures proposed as part of Part B or within the Study Area.	N/A

Appendix C

RISK RECORD

Appendix C – Risk Record Screened in Major Events

This is an extract from the Major Events assessment process of those risk events to which Part B is potentially vulnerable. Therefore, it should be noted that the risk record entry numbers do not run sequentially.

Risk Record Entry number	Section of the Part B	Hazard Description	Applicable Phases (C=Construction, O=Operational, M=Maintenance)	Hazard Sources and/or Pathways	Risk Description	Documentation in which the Event is/would be Addressed	Reasonable Worst Consequence if Event did Occur and Receptor(s)	Air quality	Climate	People and Communities	Biodiversity	Cultural Heritage	Geology and Soils	Landscape and visual	Noise and vibration	Transport	Material resources	Road Drainage and the Water Environment	Primary Mitigation	Could this constitute a Major Event?	Justification	Is this ALARP with existing mitigation?	Clarification
1	Sections of Part B located within high and medium risk areas from Environment Agency's Surface Water Flood Risk Map	Pluvial flooding	C, M,O	Heavy precipitation on Part B which the drainage network cannot cope with risks due blockage, channel roughness, downstream water and exceedance events.	A review of the Environment Agency Flood Risk from Surface Water map indicates that sections of Part B are at high, medium and low risk of flooding from surface water sources. The HADDMS online database indicates that the Alnwick to Ellingham section of the existing A1 has two documented surface water flood events. These are not classified as severe flood events and have a severity	Flood Risk Assessment Road drainage network design specification	Death or injury to multiple road users			X			X			X		X	The proposed drainage strategy would restrict surface water runoff rates to the existing greenfield runoff values for the equivalent storm event. Highway drainage would be designed to accommodate a 1 in 1 year design flow without	Y	Could cause loss of life or permanent injury to multiple road users.	Y	Assuming primary mitigation effectively managed and implemented.

Risk Record Entry number	Section of the Part B	Hazard Description	Applicable Phases (C=Construction, O=Operational, M=Maintenance)	Hazard Sources and/or Pathways	Risk Description	Documentation in which the Event is/would be Addressed	Reasonable Worst Consequence if Event did Occur and Receptor(s)	Air quality	Climate	People and Communities	Biodiversity	Cultural Heritage	Geology and Soils	Landscape and visual	Noise and vibration	Transport	Material resources	Road Drainage and the Water Environment	Primary Mitigation	Could this constitute a Major Event?	Justification	Is this ALARP with existing mitigation?	Clarification
					index of less than one.														surcharging and a 1 in 5 year flow without surface flooding of the running carriageways (with a 20 % allowance for climate change).				
8	Route wide	Earthworks and construction activities (e.g. overturning of crane / dropped load) adjacent to operational areas of the existing structures.	C	Construction activities adjacent to existing structures and live roads.	Damage to highway infrastructure leading to death or injury of workers and road users.	CDM register Construction H&S Plan Lifting Operations Plan Traffic management plan	Collapse/impact leads to harm to construction and other workers and road users in the vicinity.			X					X			Construction phase H&S plan	Y	Could cause loss of life or permanent injury to multiple road users.	Y	Assuming the effective implementation of the construction phase H&S plan

Risk Record Entry number	Section of the Part B	Hazard Description	Applicable Phases (C=Construction, O=Operational, M=Maintenance)	Hazard Sources and/or Pathways	Risk Description	Documentation in which the Event is/would be Addressed	Reasonable Worst Consequence if Event did Occur and Receptor(s)	Air quality	Climate	People and Communities	Biodiversity	Cultural Heritage	Geology and Soils	Landscape and visual	Noise and vibration	Transport	Material resources	Road Drainage and the Water Environment	Primary Mitigation	Could this constitute a Major Event?	Justification	Is this ALARP with existing mitigation?	Clarification
16	Rock Midstead	Ground subsidence leading to damage of roadway and/or associated infrastructure.	C,M,O	Collapse of carriageway (Rock South Farm Access Road)	Several parts of the Order Limits lie within the Coal Authority Mining Reporting Area with specific sections classified as Development High Risk Areas (DHRA). Most of the DHRAs are within the 250 m buffer rather than the Part B itself. There are two DHRAs located where construction works would be taking place: Heckley Fence DHRA and the Rock Midstead DHRA. Note: The Rock Midstead DHRA traverses the Rock South Farm Access	Coal Mining Risk Assessment CDM register Method Statements Construction H&S Plan	Death and / or injury to multiple road users.			X						X			Risk assessment to inform requirements e.g. to grout up and stabilise shallow coal workings and cap shafts, and design suitable earthworks, structures not to be impacted be poorly compacted ground.	Y	Could cause loss of life or permanent injury to multiple road users.	Y	Assuming effective implementation of mitigation measures to be identified in Coal Mining Risk Assessment.

Risk Record Entry number	Section of the Part B	Hazard Description	Applicable Phases (C=Construction, O=Operational, M=Maintenance)	Hazard Sources and/or Pathways	Risk Description	Documentation in which the Event is/would be Addressed	Reasonable Worst Consequence if Event did Occur and Receptor(s)	Air quality	Climate	People and Communities	Biodiversity	Cultural Heritage	Geology and Soils	Landscape and visual	Noise and vibration	Transport	Material resources	Road Drainage and the Water Environment	Primary Mitigation	Could this constitute a Major Event?	Justification	Is this ALARP with existing mitigation?	Clarification
					Road which is proposed to be upgraded via widening to the western edge of the existing track.																		
17	NGN gas pipelines near: Mainline CH58+200m - CH59+100m Mainline CH59+100m - CH60+000m Mainline CH60+000m - CH60+300	Presence of underground intermediate pressure gas pipeline	C	Release of flammable gas from pipeline	It is proposed to divert 2025 m of intermediate pressure gas main on the west of the A1 from Ch58+200m to Ch58+600m and Ch58+800 and Ch60+300m. Striking of underground services or utilities - when undertaking gas diversion works or from adjacent construction work on the road. Loss of containment	CDM register Construction H&S Plan Pipeline Safety Report Safe Systems of Work	Fire and/or explosion affects neighbouring property and/or members of the public.	X		X									Management of change process (utilities provider), actions identified in the CDM register, coordination & cooperation between all parties involved, use of good engineering practices.	Y	Could cause loss of life or permanent injury to multipole members of the public; or significant structural property damage.	Y	Assuming: - Route of pipeline chosen to minimise crossover of other known buried services or utilities - GPR survey of route undertaken prior to construction works. - Construction Phase H&S plan.

Risk Record Entry number	Section of the Part B	Hazard Description	Applicable Phases (C=Construction, O=Operational, M=Maintenance)	Hazard Sources and/or Pathways	Risk Description	Documentation in which the Event is/would be Addressed	Reasonable Worst Consequence if Event did Occur and Receptor(s)	Air quality	Climate	People and Communities	Biodiversity	Cultural Heritage	Geology and Soils	Landscape and visual	Noise and vibration	Transport	Material resources	Road Drainage and the Water Environment	Primary Mitigation	Could this constitute a Major Event?	Justification	Is this ALARP with existing mitigation?	Clarification
					during works on the gas pipeline e.g. when connecting the new system to the existing system.																		
18	NGN gas pipelines near: Mainline CH58+200m - CH59+100m Mainline CH59+100m - CH60+000m Mainline CH60+000m - CH60+300	Presence of underground intermediate pressure gas pipeline	C,M,O	Release of flammable gas from pipeline	Ground subsidence leading to loss of containment.	CDM register Safe Systems of Work	Fire and/or explosion affects neighbouring properties and/or those people in the immediate area.	X		X						X			Management of change process (utilities provider), actions identified in the CDM register, coordination & cooperation between all parties involved, use of good engineering practices.	Y	Could cause loss of life or permanent injury to multiple members of the public; or significant structural property damage.	Y	Assuming: - Route of pipeline chosen to minimise crossover of other known buried services or utilities- GPR survey of route undertaken prior to construction works. - Construction Phase H&S plan.
19	Main Compound	Main Compound is located within Eshott	C	Compound location affecting airfield operations	Air accident causing harm to people.	CDM register Method Statements Construction H&S plan	Death or injury to members of the public or			X						X			Design, construction and operation of	Y	Could cause loss of life or permanent injury to	Y	Assuming the effective implementation of the mitigation

Risk Record Entry number	Section of the Part B	Hazard Description	Applicable Phases (C=Construction, O=Operational, M=Maintenance)	Hazard Sources and/or Pathways	Risk Description	Documentation in which the Event is/would be Addressed	Reasonable Worst Consequence if Event did Occur and Receptor(s)	Air quality	Climate	People and Communities	Biodiversity	Cultural Heritage	Geology and Soils	Landscape and visual	Noise and vibration	Transport	Material resources	Road Drainage and the Water Environment	Primary Mitigation	Could this constitute a Major Event?	Justification	Is this ALARP with existing mitigation?	Clarification
		Airfield's Safeguarding Zone - possible impacts on airfield operations e.g. compound lighting and other structures, construction equipment such as cranes and piling rigs etc.		and potentially causing an air accident		CEMP Airfield Safeguarding Report	construction workers.												compound informed by Airfield Safeguarding Report.		multiple members of the public		measures within the Airfield Safeguarding Report
21	Heckley Fence Accommodation Bridge	Ground subsidence leading to damage of roadway and/or associated infrastructure.	C,M,O	Collapse of overhead structure onto carriageway. Collapse of carriageway.	Several parts of the Order Limits lie within the Coal Authority Mining Reporting Area with specific sections classified as Development High Risk Areas (DHRA). Most of the DHRA's are within the 250 m buffer	Coal Mining Risk Assessment CDM register Method Statements Construction H&S Plan	Death or injury to multiple road users.			X					X				Ground investigation and risk assessment to inform requirements e.g. to grout up and stabilise shallow coal workings and cap shafts,	Y	Could cause loss of life or permanent injury to multiple road users.	Y	Assuming effective implementation of mitigation measures to be identified in Coal Mining Risk Assessment.

Risk Record Entry number	Section of the Part B	Hazard Description	Applicable Phases (C=Construction, O=Operational, M=Maintenance)	Hazard Sources and/or Pathways	Risk Description	Documentation in which the Event is/would be Addressed	Reasonable Worst Consequence if Event did Occur and Receptor(s)	Air quality	Climate	People and Communities	Biodiversity	Cultural Heritage	Geology and Soils	Landscape and visual	Noise and vibration	Transport	Material resources	Road Drainage and the Water Environment	Primary Mitigation	Could this constitute a Major Event?	Justification	Is this ALARP with existing mitigation?	Clarification
					rather than the Part B itself. There are two DHRAs located where construction works would be taking place: Heckley Fence DHRA and the Rock Midstead DHRA.														and design suitable earthworks, structures not to be impacted be poorly compacted ground.				
22	Heckley Fence Accommodation Bridge	Transportation of bridge components Phased construction of bridge in immediate proximity of operational public highway	C	Road users on the existing A1 Falling objects cause road traffic accident	1) Injury to third parties; 2) Debris falling on public highway resulting in accident; 3) Damage to third party utilities or services located on or near bridges	CDM register Method statements Construction H&S plan Traffic management plan	Death or injury to members of the public, construction workers and Highways England personnel			X					X				Construction phase H&S plan	Y	Could cause loss of life or permanent injury to multiple members of the public.	Y	Assuming the effective implementation of the construction phase H&S plan
23	Heckley Fence Accommodation Bridge	Vehicle falling from new bridge.	O	Road users on the existing and new A1	Vehicle falling from new bridge onto existing A1 road users below.	Bridge design specification	Death or injury to multiple road users.			X					X				Bridge design specification	Y	Could cause loss of life or permanent injury to multiple road users.	Y	Assuming the effective implementation of bridge design specification

Risk Record Entry number	Section of the Part B	Hazard Description	Applicable Phases (C=Construction, O=Operational, M=Maintenance)	Hazard Sources and/or Pathways	Risk Description	Documentation in which the Event is/would be Addressed	Reasonable Worst Consequence if Event did Occur and Receptor(s)	Air quality	Climate	People and Communities	Biodiversity	Cultural Heritage	Geology and Soils	Landscape and visual	Noise and vibration	Transport	Material resources	Road Drainage and the Water Environment	Primary Mitigation	Could this constitute a Major Event?	Justification	Is this ALARP with existing mitigation?	Clarification
24	Heckley Fence Accommodation Bridge	Vehicle falling from new bridge.	O	Road users on the existing and new A1	Vehicle falling from new bridge onto existing A1 road users below.	Bridge design specification	Death or injury to multiple road users.			X						X			Bridge design specification	Y	Could cause loss of life or permanent injury to multiple road users.	Y	Assuming the effective implementation of bridge design specification
25	Charlton Mires Junction Bridge	Transportation of bridge components Phased construction of bridge in immediate proximity of operational public highway	C	Road users on the existing A1 Falling objects cause road traffic accident	1) Injury to third parties; 2) Debris falling on public highway resulting in accident; 3) Damage to third party utilities or services located on or near bridge	CDM register Method statements Construction H&S plan Traffic management plan	Death or injury to members of the public, construction workers and Highways England personnel			X						X			Construction phase H&S plan	Y	Could cause loss of life or permanent injury to multiple members of the public.	Y	Assuming the effective implementation of the construction phase H&S plan
26	Charlton Mires Junction Bridge	Vehicle falling from new bridge.	O	Road users on the existing and new A1	Vehicle falling from new bridge onto existing A1 road users below.	Bridge design specification	Death or injury to multiple road users.			X						X			Bridge design specification	Y	Could cause loss of life or permanent injury to multiple road users.	Y	Assuming the effective implementation of bridge design specification

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