A1 in Northumberland: Morpeth to Ellingham

Scheme Number: TR010041

6.11 Scoping Report Part B

Planning Act 2008

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

Regulations 5(2)

Volume 6

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]

SCOPING REPORT PART B

Regulation Reference:	Regulations 5(2)
Planning Inspectorate Scheme Reference	TR010041
Application Document Reference	TR010041/APP/6.11
Author:	A1 in Northumberland Project Team, Highways England

Version	Date	Status of Version
Rev 0	June 2020	Application Issue

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A1 in Northumberland

Alnwick to Ellingham

Environmental Impact Assessment Scoping Report

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November 2018

A1 IN NORTHUMBERLAND ALNWICK TO ELLINGHAM

ENVIRONMENTAL IMPACT ASSESSMENT SCOPING REPORT

Highways England

Date: November 2018

Project no: 70038006

HE PIN: HE551459-WSP-EGN-A2E-RP-LE-1257
WSP Ref: A2E EIA SCR HE FINAL

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A1 IN NORTHUMBERLAND: ALNWICK TO ELLINGHAM

Environmental Impact Assessment Scoping Report

TYPE OF DOCUMENT (VERSION) PUBLIC

PROJECT NO. HE551459-WSP-EGN-A2E-RP-LE-1257
OUR REF. NO. A2E EIA SCR FINAL

DATE: NOVEMBER 2018

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1 INTRODUCTION

1.1 PURPOSE OF THE REPORT

1.1.1. This Scoping Report has been prepared in accordance with Section 10 of The Infrastructure Planning (Environmental Impact Assessment [EIA]) Regulations 2017, hereinafter referred to as the 'EIA Regulations'.

1.1.2. The purpose of this Scoping Report is to set out the proposed scope of the EIA for the A1 in Northumberland Alnwick to Ellingham (the "Scheme"). This report has been prepared to support a request for a Scoping Opinion from the Planning Inspectorate (hereinafter referred to as "the Inspectorate"). This process will provide feedback on any additional information to be provided in the Environmental Statement (ES) in support of an application for a Development Consent Order (DCO) to be submitted to the Inspectorate in due course.

1.1.3. The main objectives of this Scoping Report are to:

- Provide a description of the Scheme and to inform the key stakeholders;
- Identify the topics and issues that are proposed to be the focus of the environmental assessment (i.e. those that are 'scoped in');
- Eliminate those topics and issues not requiring further consideration and which would therefore not be taken further in environmental assessment (if appropriate) (i.e. those that are 'scoped out');
- Determine the level of assessment needed for each topic area, whether **Simple** or **Detailed**;
- Define the technical, spatial and temporal scope of the study for each of the topics and issues to be considered;
- Define the approach to, and methodologies for, conducting baseline studies;
- Define the approach to, and methodologies for, predicting environmental impacts and for evaluating the significance of environmental effects;
- Provide details of the consultation strategy to be applied to the environmental assessment process; and
- Provide the mechanism through which comments from key stakeholders can be sought.

1.1.4. The information provided in this Scoping Report is based on best available information at the time of writing.

1.2 OVERVIEW OF THE SCHEME

1.2.1. Highways England has identified the need to improve the existing A1 in Northumberland between Alnwick to Ellingham.

1.2.2. The Scheme is in the County of Northumberland, extending for approximately 8 km between the single carriageway north of Denwick to the dual carriageway south of Brownieside. Refer to **Appendix A - Figure A1: Scheme Location Plan**.

1.2.3. The Scheme includes online widening to upgrade the existing road from a single carriageway to a two-lane dual carriageway. Throughout the length of the Scheme, the existing A1 would form the new northbound carriageway and a new southbound carriageway would be built to the east of the existing A1.

1.2.4. The existing at-grade junction at Charlton Mires would be replaced with a compact grade separated junction called Charlton Mires Junction. Two options for the location of Charlton Mires Junction are being considered at the time of writing; with one option being located at Charlton Mires and the second option to the south of Charlton Mires within the red-line boundary. The option located at Charlton Mires was presented in the Preferred Route Announcement. The second option located to the south of Charlton Mires is being considered as it may provide improved junction layout and functionality.

1.2.5. For both options, direct accesses onto the A1 from several properties and businesses on both sides would be stopped up at this location, and instead new access tracks would be provided linking these properties to either the B6341 or the B6347. Residents would then be able to access the A1 via these roads and the new grade-separated junction. For both options, Public Rights of Way (PRoW) 129/005 would also be upgraded to an access track to service Rock South Farm. In addition, it is anticipated that two residential dwellings would

need to be demolished to accommodate the option located at Charlton Mires. The rest of the Scheme, as described below, would be the same for both options at Charlton Mires Junction.

1.2.6. An accommodation bridge for vehicular and non-motorised users (pedestrians, cyclists and equestrians) would be provided across the A1 at Broxfield, called the Broxfield Bridge. Two locations for the Broxfield Bridge are being considered at the time of writing; with one option being located at the crossing point for the existing Byway or directly to the east of Heckley Fence. The first option is being considered as it provides safe access for users of the byway by segregating non-motorised users from strategic traffic. The second option, to the east of Heckley Fence, is being considered as it would benefit the farming operations of a farmer using land either side of the A1 at this location.

1.2.7. Access tracks for properties at West Linkhall / Paterson Cottage and East Linkhall would run parallel to the upgraded A1 on both sides.

1.2.8. Existing PRoW in the Scheme Footprint would be diverted temporarily during the construction works and permanently during the operation of the Scheme. The Scheme would also include the provision of parking lay-bys. There will be no bus lay-bys on the main carriageway, however bus stops will be included in both directions on the B6341 to the south of the new Charlton Mires junction.

1.2.9. Attenuation ponds, additional culverts as well as the extension of existing culverts would be included in the Scheme design where appropriate. Utilities would also need to be diverted as part of the Scheme.

1.2.10. During the construction of the Scheme, two temporary site compounds would be utilised. The main compound would be 7 ha in size and shared with the A1 in Northumberland: Morpeth to Felton scheme, located adjacent to Westmoor Junction, off Felton Road, hereafter referred to as the 'Main Compound'. A second site compound would be 14 ha in size and located to the south of Alnwick, adjacent to Highways England's salting and gritting depot at Lionheart Enterprise Park. This salting and gritting depot was designed to service the A1 in Northumberland. It is anticipated that construction plant, materials and waste would be stored at the Alnwick site compound alongside welfare and office facilities. There would be shared staff and resources and limited plant and materials located at the Main Compound.

1.2.11. The purpose of sharing the Main Compound with the A1 in Northumberland: Morpeth to Felton scheme, is to reduce the size of the compound required for this Scheme. However, should the Morpeth to Felton scheme not proceed, there is sufficient area within the Scheme area and the Lionheart Enterprise Park Compound to accommodate the required space for the construction compound and there would be no further requirement for temporary land.

1.2.12. The Main Compound could, however, increase the number and length of journeys required during construction due to the location of the Main Compound and generation of journeys between the site compounds. It is estimated at this stage of the Scheme that 20 wagon or low loader movements would be generated per week between the site compounds and 10 workforce movements would be generated per week between the site compounds. However, these numbers will be refined as the Scheme progresses.

1.2.13. It should be noted that if the two site compounds are deemed unsuitable and / or if the Lionheart Enterprise Park Compound is not available at the time of construction, a field to the south-east of Charlton Mires would be used as a temporary construction site compound. This potential site compound is located within the red-line boundary and called Charlton Mires Site Compound.

1.2.14. The Scheme is defined as a Nationally Significant Infrastructure Project (NSIP) under Section 14(1)(h) and section 22 of the Planning Act 2008 (PA2008) (as amended by the Highway and Railway (Nationally Significant Infrastructure Project) Order 2013) as:

- It comprises the alteration of a highway;
- The highway to be altered is wholly in England;
- The Secretary of State is the highway authority for the highway;
- The speed limit is 50 mph or greater; and
- The area of development of the highway at 31.1 hectares, is greater than 12.5 hectares.

1.2.15. Therefore, in accordance with the legislation a DCO is required to allow the construction and operation of the Scheme.

THE SCHEME FOOTPRINT

1.2.16. The Scheme Footprint includes all temporary and permanent land required to deliver the Scheme. The Scheme Footprint is defined by the red line shown in **Appendix A - Figure A2: Environmental Constraints Plan**. The red line is hereafter referred to as 'the Scheme Footprint'.

1.2.17. The Scheme Footprint currently allows for some flexibility as the design progresses and the optimum alignment is considered. It currently includes:

- Options for attenuation ponds;
- Options for PRoW diversions;
- Options for temporary construction compounds;
- Allowance for environmental mitigation
- Allowance for variation in the location of Charlton Mires Junction; and
- Allowance for variation in the location of Broxfield Bridge.

1.3 LEGISLATIVE AND POLICY FRAMEWORK

1.3.1. The determination of whether a project requires EIA under the EIA Directive 2014/52/EU and the subsequent notification requirements in accordance with the EIA Regulations is known as 'Screening'. An EIA Screening exercise (**Ref 1.1**) was completed for the Scheme at the Preliminary Design stage.

1.3.2. The EIA Screening determined that the Scheme does not fall within the criteria listed in "Schedule 1" of the EIA Regulations which are: Schedule 1 Part 7(2):

'construction of motorways and expressed roads' and Schedule 1 Part 7(3) 'construction of a new road of four or more lanes, or realignment and/or widening of an existing road of two lanes or less so as to provide four or more lanes, where such new road, or realigned and/or widened section of road would be 10 kilometres or more in a continuous length roads'.

1.3.3. However, the Scheme does fall under Schedule 2, Part 10f (construction of roads) of the EIA Regulations. Due to the close proximity and potential direct impacts on 'sites of historical, cultural or archaeological significance' as set out in Regulation 9(1), the Scheme is considered to be 'EIA development'.

1.3.4. The National Planning Policy Framework (NPPF) (**Ref. 1.2**.) sets out the Government's planning policies for England and how these should be applied. The principles of the Revised National Planning Policy Framework will be considered throughout the development of the Scheme. Consideration will be given to 'achieving sustainable development' and 'promoting sustainable transport'. In addition, the topic specific paragraphs of the NPPF are considered in the specialist chapters of this Scoping Report. The National Policy Statement for National Networks (NPS NN) (**Ref. 1.3**) sets out the need for and Government's policies to deliver, development of NSIPs on the national road and rail networks in England. The NPS NN will also be considered throughout the development of the Scheme, with relevant paragraphs of the NPS NN detailed within the specialist chapters of this Scoping Report. Topic specific policies are also presented within each specialist chapter within this Scoping Report.

1.4 SCHEME ROLES

THE DESIGNER

1.4.1. WSP has been commissioned by Highways England under their Collaborative Delivery Framework (CDF) to undertake the preliminary design of the Preferred Option, which includes undertaking the EIA for the Scheme.

THE DEVELOPER

1.4.2. Highways England is appointed and licensed by the Secretary of State for Transport as the strategic highways company for England. It is responsible for operating, maintaining and improving the strategic road network. The network is made up of England's motorways and all-purpose trunk roads (Major 'A' Roads) and the A1 is part of the trunk road network.

1.5 REPORT STRUCTURE

1.5.1. This Scoping Report is structured as follows:

- Chapter 2 details information on the need for the Scheme, a description of the Scheme and the Scheme objectives;
- Chapter 3 details the assessment of alternatives;
- Chapter 4 details any previous and proposed consultation;
- Chapter 5 details the approach to the environmental assessment;
- Chapter 6 – 15 details the proposed scope of the individual environmental assessments;
- Chapter 16 details the proposed scope of the cumulative effects assessment;
- Chapter 17 provides a summary of the findings; and
- Chapter 18 sets out the next steps.
- References
- Abbreviations
- Appendix A: Figures
- Appendix B: Transboundary Effects Screening Matrix
- Appendix C: Detailed Landscape Character Information

2 THE SCHEME

2.1 NEED FOR THE SCHEME

2.1.1. The A1 is one of the longest roads in the country, connecting London to Newcastle and Edinburgh. The route currently consists of motorway standard and dual carriageway standard, with some single carriageway sections running between Morpeth and Ellingham and north of Ellingham up to Berwick.

2.1.2. In Northumberland, the A1 runs through an extensive rural landscape, close to the coastline. This section of the A1 is used by a wide variety of road users for many different reasons. These include business users travelling long distance between Newcastle and Edinburgh, local traffic accessing rural areas where there is no public transport, and tourists who come to visit the many historic attractions and coastline.

2.1.3. Over the last decade there have been significant upgrades to the A1 south of Newcastle, with many sections upgraded to motorway standard, and there are further plans to improve sections of the A1 around Newcastle and Gateshead.

2.1.4. There have been long standing calls to Government from key stakeholders and businesses to progress plans to dual the A1 in Northumberland. The 2014 Feasibility Study (**Ref. 2.1**) considered the problems experienced by users of the A1 in Northumberland. The following problems were identified:

- Drivers face a lack of alternative routes for their journeys;
- Varying carriageway standards on the route. This can lead to confusion for long distance drivers;
- Poor junction standards and layout - there are many different types of junctions along the route which can be confusing for those who are not familiar with the route;
- Many junctions and private accesses, resulting in delays and potential accidents when vehicles exit or enter the main carriageway;
- Average traffic speeds on the single carriageway sections of the route are significantly lower than sections that have been upgraded to dual carriageway;
- A high proportion of heavy goods and agricultural vehicles north of Alnwick resulting in reduced speeds for following vehicles;
- Lack of overtaking opportunities on single carriageway sections of the route which slows down traffic; and
- Peak-hour traffic speeds are significantly slower than when traffic is free flowing.

2.1.5. The Scheme is designed to address these issues and improve the safety and speed of journeys along the route.

2.1.6. The Feasibility Study (**Ref. 2.1**) also considered the full route of the A1 in Northumberland between its junction with the A19 at Seaton Burn and the Scottish border. The study included engineering and economic aspects and the identification of environmental constraints. It was determined that this Scheme should be taken forward into the Roads Investment Strategy (RIS) for delivery in the current roads period.

2.2 SCHEME OBJECTIVES

2.2.1. The Scheme's objectives (**Ref 2.2**), are to:

1. Improve journey times on this route of strategic national importance;
2. Improve network resilience and journey time reliability;
3. Improve safety;
4. Maintain access for local traffic whilst improving the conditions for strategic traffic;
5. Facilitate future economic growth;
6. Avoid, mitigate and compensate for potential impacts upon the built and natural environment;
7. To seek to support the aim of no net loss of biodiversity;
8. To ensure effective measures are in place to protect watercourses from pollutant spillage on the highway; and

9. To investigate and encourage the use of environmentally friendly operations and products throughout the Scheme life cycle.

2.2.2. In addition, decisions on the Scheme will be made in the context of the Performance Specification set out for Highways England in the RIS which identifies Key Performance Indicators, targets and requirements relating to the environment and to cyclists, walkers and other vulnerable users of the network (e.g. horse riders).

2.3 SCHEME LOCATION

2.3.1. The Scheme is located within the County of Northumberland and forms part of Highways England's strategic road network. The Scheme is located on the A1 from 1150 m north of the B1340 at Denwick northward to 360 m south of existing junction at North Charlton and is approximately 8 km between in length (see **Appendix A - Figure A1: Scheme Location Plan**).

2.3.2. The area within a 1 km buffer of the Scheme, as shown in **Appendix A - Figure A2 Environmental Constraints Plan,** is characterised by predominantly rural land uses, with the existing A1 running adjacent to arable and pasture fields (Grade 3 agricultural land) and near woodlands. The existing A1 is a large linear feature which dissects the gently rolling landscape. To the east, the landform gradually rises to approximately 100 m Above Ordnance Datum (AOD) near Rennington Moor. To the west, the land is slightly hillier with more undulations and a high point of approximately 140 m AOD near White House Folly. A number of natural resources and areas classified or protected under legislation and policy are located within the corridor and surrounding area as detailed below. The below text is split into three sections of the Scheme, including the area of permanent works (the area within the red-line boundary includes the Scheme Footprint and both temporary and permanent areas of works – i.e. between Alnwick and Brownieside), site compound at Lionheart Enterprise Park and the Main Compound, located at Westmoor Junction, off Felton Road.

SCHEME FOOTPRINT

2.3.3. The largest town within 5 km of the area of permanent works is Alnwick, which is located south-west of the most southern extent of the Scheme. Smaller hamlets and villages such as Denwick, South Charlton, North Charlton and Brownieside are interspersed throughout the length of the Scheme. In addition, isolated residential dwellings, commercial properties and several farms lie adjacent to the Scheme, within the red-line boundary. A network of PRoW crosses and lie within 500 m of the Scheme. There are no National Cycle Routes or National Trails within 500 m of the Scheme.

2.3.4. There are no Air Quality Management Areas (AQMAs) or Noise Important Areas within or near the Scheme. Two registered park and gardens are located within the vicinity of Scheme: Alnwick Castle approximately 1 km to the south-west and Howick Hall approximately 5 km to the east. Northumberland Coast Area of Outstanding Natural Beauty lies approximately 5 km to the east of the Scheme. The Kyloe Hills and Glendale Area of High Landscape Value and an Intermediate Area of Landscape Value are situated approximately 1 km north of the Scheme. In addition, a former Area of High Landscape Value is situated to the west of the Scheme. Key visual receptors include individual rural properties and recreational viewpoints from PRoW.

2.3.5. There are nine Scheduled Monuments located within 1 km of the Scheme, with seven of these being below ground archaeological remains and earthworks. One Scheduled Monument is located within the Scheme Footprint, two Scheduled Monuments abut the red-line boundary and one is located in close proximity to the red-line boundary. A total of 51 built heritage assets are located within 1 km of the Scheme and consist of 42 assets designated as Listed Buildings, two designated as Scheduled Monuments (note – one of these is also a Listed Building) and eight non-designated heritage assets. Two mileposts are located within the Scheme Footprint; Milepost 40 m north of entrance to Heckley House (NHLE 1153486) and Milepost north of Shipperton Bridge (HER 16878). Two Grade II listed buildings, Patterson Cottage (NHLE 1371080) and West Linkhall Farmhouse (NHLE 1298856), lie within 25 m of the Scheme Footprint. There are 15 Historic Landscape types recorded within 500 m of the Scheme. There is also potential for underground unknown buried archaeological remains.

2.3.6. No statutory ecological sites are located within the Scheme Footprint. Four Special Areas of Conservation as well as one Special Protection Area and Ramsar are located within 10 km of the Scheme. One Local Nature Reserve (Hulne Park) is situated 1.5 km west of the Scheme and one Local Wildlife Site (Ratcheugh Crag – Pepper Moor) 2 km east of the Scheme. A number of protected and / or notable species recorded or suspected within the surrounding area include badger, Great Crested Newts (GCN), bats, barn owl, badgers, water vole, otter, reptiles, red squirrel, breeding and wintering birds as well as terrestrial invertebrates.

Swineclose Wood is an area of ancient semi-natural woodland 5.18 ha in size, located 1.88 km to the north-east of the Scheme.

2.3.7. The majority of the Scheme alignment is located in the low risk Flood Zone 1 where the risk of flooding from fluvial sources is less than 1 in 1000 (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 to the east of Shipperton Bridge, where the risk of flooding from fluvial sources is greater than 1 in 100 in any year. Sections of the Scheme are at high, medium and low risk of flooding from surface water sources. The Scheme alignment crosses or is located within 500 m of 16 ordinary watercourses. There are no Main Rivers within 500 m of the Scheme.

2.3.8. The Scheme is underlain by Secondary A Aquifer in the bedrock. The majority of the Scheme is underlain by Secondary (Undifferentiated) Aquifer in the superficial deposits. Small sections of superficial deposits classified as Secondary A Aquifer are located in the northern and southern sections of the Scheme. The Scheme is not located within a Source Protection Zone.

2.3.9. The construction of the Scheme would require the production, transport and use of materials, and the generation of waste.

MAIN COMPOUND

2.3.10. The Main Compound is located at Westmoor Junction, off Felton Road. The site is bordered by existing tree and hedgerow planting on all boundaries. There are a number of residential receptors within vicinity of the site. To the west, on the other side of the A1, are two residential properties located approximately 400 m from the Scheme called West Moor Houses. Approximately 200 m to the east, a grouping of properties called Thirston New Houses are located. Eshott Airfield is located immediately south of the Main Compound. There are no National Trails, National Cycle Routes or PRoW within 500 m of the site. There are no AQMAs or Noise Important Areas within or near the compound.

2.3.11. There is one Grade II listed milepost recorded within the compound boundary (NHLE 1371021) although a recent site inspection failed to locate it in this location. There are three non-designated assets recorded within 500 m of the Main Compound (two below ground assets and one built heritage asset). There are eight designated built heritage assets within 1 km of the site.

2.3.12. A single statutory nature conservation site is located within 2 km of the site; the River Coquet and Coquet Valley Woodlands Site of Special Scientific Interest (SSSI). Additionally, habitats at the boundary of the compound location provide some value for nesting birds where clearance is required for access.

2.3.13. The Main Compound is located in close proximity to one watercourse; an unnamed tributary of the Thirston Burn which flows along the northern boundary of the compound and forms part of the Northumbria Rivers Basin District. The Thirston Burn discharges into the River Coquet approximately 4 km downstream of the compound. The River Coquet is a Main River and forms part of the River Coquet and Coquet Valley Woodlands SSSI. A surface water pond is also located approximately 400 m to the south-east of the Main Compound. The bedrock geology is classified as Secondary A Aquifer and the majority of the superficial deposits are classified as Secondary A Aquifer. There are no active or historical landfills within 250 m of the site compound.

2.3.14. The Main Compound is located within the low-risk Flood Zone 1 where the risk of flooding from fluvial sources is less than 1 in 1000 (0.1%) in any year. The compound is also at low risk of flooding from surface water sources.

LIONHEART ENTERPRISE PARK COMPOUND

2.3.15. Highways England are currently in the process of constructing a Salting and Gritting Depot at Lionheart Enterprise Park to the south of Alnwick. The proposed site compound will utilise the new depot as well as the immediately surrounding area that has been identified within the local plan for commercial development.

2.3.16. The site is bordered by an existing hedgerow to the south, existing industrial estate to the north and an existing PRoW to the west. There is a total of four PRoW within 500 m of the site. No National Trails or National Cycle Routes are located within 500 m of the site. The Duchess's Community High School is located approximately 350 m to the west of the Lionheart Enterprise Park Compound.

2.3.17. There are no AQMAs or Noise Important Areas within or near the compound. Sensitive receptors are predominantly commercial as the compound is located on an industrial estate. The nearest residential receptor is the new Hogs Head Inn and hotel approximately 400 to the west.

2.3.18. Four Grade II listed buildings lie within 1 km of the site. Part of the compound area at Lionheart Enterprise Park has already been subject to archaeological evaluation as part of an earlier Highways England planning application (Ref. 16/04691/FUL). The surveys identified several possible soil-filled features.

2.3.19. No statutory ecological designated sites are located within 2 km of the Lionheart Enterprise Park Compound. However, habitats at the boundary of the proposed compound location provide some value for nesting birds where clearance is required for access.

2.3.20. The compound is located within 500 m of two ordinary watercourses; the Willow Burn to the north; and the Cawledge Burn to the south. Superficial deposits underlying the site compound consist of Glaciofluvial deposits (Devensian) consisting of sand and gravel. The majority of the superficial deposits are classified as Secondary A Aquifer.

2.3.21. The site compound is located within the low-risk Flood Zone 1 where the risk of flooding from fluvial sources is less than 1 in 1000 (0.1%) in any year. There is a small area 400 m to the south of the compound that is in the high-risk Flood Zone 3 where the risk of flooding from fluvial sources is greater than 1 in 100 in any year. The site compound is at low risk of flooding from surface water sources. However, the land immediately adjacent to the Cawledge Burn is at a medium risk of surface water flooding.

2.3.22. A historical landfill site, East Cawledge, is located 186 m to the north of the site. Records show that the historical landfill was first recorded in 1927 and last recorded in 1972, there are no details relating to the waste types deposited.

2.4 SCHEME DESCRIPTION

2.4.1. The road design standard will be a two-lane dual carriageway to rural standards, known as D2AP. Throughout the length of the Scheme (approximately 8 km), the existing A1 would form the new northbound carriageway and a new southbound carriageway would be built to the east of the existing A1. The mainline width of each carriageway is 9.3 m. The national speed limit of 70 mph for cars, motorcycles, car-derived vans and dual-purpose vehicles, and 60 mph for those towing caravans or trailers will apply along the Scheme. A 60 mph speed limit for buses, coaches, minibuses, and goods vehicles less than 7.5 tonnes and a 50 mph speed limit for goods vehicle over 7.5 tonnes will also apply along the Scheme.

2.4.2. The construction works are planned to commence in 2021, with the Scheme being open to traffic in 2023. It is anticipated that the construction period will last approximately 18 months. The majority of the works will be undertaken during the day; however, it is anticipated that some night-time, evening and weekend work may be required.

2.4.3. A detailed description of the Scheme is provided in the following paragraphs.

CHARLTON MIRES JUNCTION

2.4.4. The existing at-grade junction at Charlton Mires would be replaced with a compact grade separated junction called Charlton Mires Junction. The exact location and layout of this is currently going through design development; with one option being located at Charlton Mires and the second option to the south of Charlton Mires within the red-line boundary (see **Appendix A - Figure A2: Environmental Constraints Plan)**. Charlton Mires Junction includes a footway to facilitate safe, pedestrian access. For both options, direct accesses onto the A1 from several properties and businesses on both sides would be stopped up at this location, and instead new access roads would be provided linking these properties to either the B6341 or the B6347. Residents would then be able to access the A1 via these roads and the new grade-separated junction. For both options, PRoW 129/005 would also be upgraded to an access road to service Rock South Farm.

2.4.5. The dimensions of this structure will be no greater than a span of 50 m, the width 13 m, the parapet height by no more than 9 m above the new road surface.

BROXFIELD OVERBRIDGE

2.4.6. An accommodation bridge for vehicular and non-motorised users (pedestrians, cyclists and equestrians) would be provided across the A1 to the west of Broxfield, called the Broxfield Bridge. Two locations for the Broxfield Bridge were being considered at the time of writing; with one option being located at the current crossing point of the byway (PRoW 110/013) and the other located at the existing crossing point at Heckley Fence, approximately 920 m to the north (see **Appendix A - Figure A2: Environmental Constraints Plan**).

2.4.7. The dimensions of this structure will be no greater than a span of 40 m, the width 9.5 m, the parapet height by no more than 8 m above the new road surface.

PRIVATE MEANS OF ACCESS

2.4.8. Private Means of Access would be provided for properties where access to the existing A1 would be stopped up to accommodate Charlton Mires Junction. Access tracks would also be provided at West Linkhall / Paterson Cottage and East Linkhall (see **Appendix A - Figure A2: Environmental Constraints Plan**). The access tracks would run parallel to the upgraded A1 on either side respectively.

RESIDENTIAL PROPERTIES

2.4.9. It is anticipated that two residential dwellings would need to be demolished to accommodate the Charlton Mires junction option located at Charlton Mires. These properties include East Cottage and Charlton Mires Farm, which are located to the east of the existing junction at Charlton Mires.

UTILITY DIVERSIONS

2.4.10. Utilities may need to be diverted as part of the Scheme, including Northumbrian Water mains, gas diversions, electric diversions, water diversions, BT telecoms, Virgin telecoms and Vodafone telecoms.

CULVERTS

2.4.11. Current estimates suggest that the Scheme would include the provision of nine new culverts and one that will require modification.

TRAFFIC COMMUNICATION

2.4.12. An initial review of existing technology between A1 Alnwick to Ellingham has been undertaken at preliminary design and it has been identified that there is minimal traffic communication technology across the Scheme extents, with only two traffic monitoring units (TMUs) currently being identified. The current recommendation is for the two existing TMUs to be replaced to current standards unless it is considered by the relevant stakeholders (Highways England's Operation Directorate and National Traffic Control Centre (NTCC)) that the sites will require to be decommissioned.

LIGHTING

2.4.13. At this stage it is considered that road lighting would not be required due to the economic and safety case not being sufficient. Further consideration will be given as to whether Charlton Mires Junction will be lit. It should be noted that this stretch of road is not currently lit.

DRAINAGE

2.4.14. The existing drainage system along the A1 would not be re-used, other than potentially the outfalls. This is due to its capacity being insufficient and the structures being in poor condition. The Scheme would be divided into drainage catchments, primarily on a topographic basis (i.e. draining from high points to low points). The drainage system for each catchment would feed an outfall into a watercourse. At this stage, the total number of catchments and therefore outfalls are not finalised, although potential locations have been considered. At each outfall location, a detention basin would be provided to ensure that the rate of flow will be attenuated to greenfield rates. The capacity of each pond would be calculated to include an appropriate allowance for climate change.

2.4.15. Treatment of water quality would primarily be provided through sedimentation in the balancing ponds, swales, vegetated channels, or alternative attenuation features. If necessary, the ponds and/or swales could be increased in size and reed beds incorporated to achieve sufficient sediment removal. Such features are most likely to be required where large catchments are required to discharge into small watercourses, so that there is little dilution. The use of oil traps and hydrodynamic vortex separators may also need to be considered.

PEDESTRIAN, CYCLISTS AND EQUESTRIANS (NON-MOTORISED USERS)

2.4.16. A network of PRoW surround and traverse the Scheme (see **Appendix A - Figure A2: Environmental Constraints Plan**). The PRoW network provides access between residential properties and recreational routes, in particular in Rennington, Rock and South Charlton.

2.4.17. At the time of writing, it is anticipated that seven PRoW would be temporarily closed or diverted during the construction phase. However, the duration and phasing of these closures is currently unknown. In addition, PRoW would be permanently diverted during the operation phase of the Scheme where it is not possible to

maintain the existing route of the PRoW. At the time of writing, there are no proposals to extinguish any PRoW.

2.4.18. A Walking, Cycling and Horse-riding Assessment Report has been prepared for the Scheme. The report includes a number of opportunities for non-motorised user facilities that could be incorporated into the Scheme design.

TRAFFIC MANAGEMENT ROUTES

2.4.19. Road closures along the A1 would be required for traffic management installation (especially removal of road markings and application of temporary markings), bridge beam installation, surfacing at tie-ins and other key tasks. In addition, closures of side roads would be required for the purposes of bridge and junction construction.

2.4.20. At the time of writing, seven potential diversion routes were being considered for the construction period. These potential diversion routes are located along the A1, B6341 and B6347, and range in length from 4.5 miles to 52.2 miles. All the diversions routes would be implemented during the night including weekends. However, it should be noted that extended closures (beyond nights and weekends) may be required. The main communities that would be affected by the diversion routes include Rennington, Preston, Bellshill, Chatton and Wooler.

TEMPORARY COMPOUNDS

2.4.21. During the construction of the Scheme, two temporary site compounds would be utilised. The Main Compound would be located to the west of Thirston New Houses (see **Appendix A - Figure A2: Environmental Constraints Plan**) and shared with the A1 in Northumberland: Morpeth to Felton scheme. A site compound would also be located to the south of Alnwick (see **Appendix A - Figure A2: Environmental Constraints Plan**) at the salting and gritting depot at Lionheart Enterprise Park. This salting and gritting depot was designed to service the A1 in Northumberland. It is anticipated that construction plant, materials and waste would be stored at the Alnwick site compound and welfare facilities located within the shared A1 in Northumberland: Morpeth to Felton site compound.

2.4.22. It is anticipated that the main vehicular journeys between the Lionheart Enterprise Park and the Site would be to transport staff (including the workforce, contractor staff and client staff), traffic management, contractor attendances (fuel bowser, road sweeper etc), contractor deliveries (including materials and plant) as well as other vehicle movements (including wagons and wheeled plant). Vehicle movements between the Main Compound and Site would be to transport staff (including the workforce, contractor staff and client staff), traffic management, contractor attendances (fuel bowser and welfare maintenance crew), contractor deliveries (including materials and plant) as well as road wagons.

2.4.23. It should be noted that if the two site compounds are deemed unsuitable and / or if the Lionheart Enterprise Park Compound is not available at the time of construction, a field to the south-east of Charlton Mires would be used as a temporary construction site compound. This potential site compound is called Charlton Mires Site Compound and is located within the red line boundary to the east of the existing A1, in an existing field to the south of Charlton Mires.

3 ASSESSMENT OF ALTERNATIVES

3.1 ALTERNATIVES ASSESSMENT METHODOLOGY

3.1.1. The development of options followed Highways England's governance frameworks as follows:

- Strategy, Shaping & Prioritisation Stage;
- Option Identification Stage;
- Option Selection Stage; and
- Preliminary Design Stage (the current Stage).

STRATEGY, SHAPING & PRIORITISATION STAGE

3.1.2. In February 2014, a Feasibility Study (**Ref. 2.1**) was undertaken to consider the full route of the A1 in Northumberland between its junction with the A19 at Seaton Burn and the Scottish border. The study included engineering and economic aspects and the identification of environmental constraints. The feasibility of conceptual options was appraised using sifting tools.

3.1.3. This Study led to the definition of a scope of work for improvement to the A1 in Northumberland as announced in the RIS in December 2014, which was progressed to the Option Identification Stage.

OPTION IDENTIFICATION STAGE

3.1.4. The scope of work for the improvement to the A1 in Northumberland was refined at this stage. Three route options were identified for A1 in Northumberland: Alnwick to Ellingham, taking into account the environmental constraints previously identified in the feasibility study. The three options were as follows:

- Orange Option: Upgrade the existing road to dual carriageway, widening either to the east or the west depending on the local features that needed to be considered.
- Green Option: Upgrade approximately 1.2 miles (2 km) of existing road to dual carriageway, and build a new carriageway to the east of the existing road at Heckley Fence, before crossing over to the west of the existing road at Elsnook Plantation and continuing until Shipperton Burn.
- Blue Option: Upgrade the majority of the existing road to dual carriageway, with approximately 2.2 miles (3.5 km) section of new carriageway built to the west of the existing route between Elsnook Plantation and Shipperton Burn.

3.1.5. An early public engagement exercise was undertaken in May 2016 to obtain feedback which would aid the development and consideration of the three route options.

3.1.6. A Preliminary Economic Assessment was also progressed at this stage, in order to refine the options.

OPTION SELECTION STAGE

3.1.7. In September 2016, the Option Selection Stage commenced to further consider the options. Only the Orange Option was taken through into the Option Selection Stage for A1 in Northumberland: Alnwick to Ellingham due to funding constraints.

3.1.8. The Option Selection Stage Environmental Assessment Report (EAR) (**Ref 3.1**) presents the potential environmental effects of delivering the Orange Option. This option includes widening the existing A1 to the east, constructing a second carriageway alongside the existing A1. The option includes one new junction at Charlton Mires, connecting the A1, B6341 and B6347. All the accesses onto the current A1 would be closed, except two existing private accesses from properties immediately adjacent to the A1 near Charlton Mires which would become left-in, left-out only access. Access from other properties would be via local roads to the new junctions. The existing junctions with the B6341 and B6347 would be closed where they currently access the A1, and diverted to join the new dual carriageway at the new junction. New local roads and access bridges would provide access for businesses and properties to the new junctions. The Byway open to all traffic near Broxfield would cross the A1 on a bridge.

PRELIMINARY DESIGN STAGE

3.1.9. The Orange Option was taken forward as the Preferred Option for progression into the Preliminary Design Stage. This is as the Orange Option was the only option deemed viable due to funding constraints.

3.1.10. The Preferred Route Announcement was issued in September 2017 by Highways England. Details can be found at the following location: https://highwaysengland.citizenspace.com/he/a1-in-northumberland/results/n170030_a1-northumberland_pra---morpeth-to-ellingham_v3_digital.pdf.

3.1.11. This Scoping Report considers the preferred route only.

Review of route alignment option

3.1.12. Following the Preferred Route Announcement, work has been completed to determine whether the new carriageway would be located to the east or the west of the existing carriageway.

3.1.13. Initially it was considered that alignment to the west would be most beneficial as this would avoid the need to divert 5 km of extra high voltage (EHV) cables that originate at Middlemoor windfarm and the associated costs of completing this work. Although the wind farm is located on the west, the cable runs to the east of the existing carriageway from the southern extent of the scheme up to the existing junction adjacent to Charlton Mires where it transfers to the west.

3.1.14. Retaining the EHV cable in its current location and building the new carriageway to the west was considered a significant financial saving to the Scheme due to the reduced requirement to divert the cable. However, when constructability was considered, this option was considered unviable on Health and Safety grounds due to the risks associated with constructing new drainage infrastructure immediately adjacent to the EHV. It is understood that the cable would be diverted ahead of the main works and that it would be located at a safe distance to the construction of drainage infrastructure.

3.1.15. Further to the issues associated with the diversion of the EHV cable, the alignment to the east is required for operational performance and to retain two houses located directly to the west of the Scheme. The alignment to the west would require the new carriageway cross section to be unconventionally profiled to meet accepted design and safety standards and for it to tie in to the existing dual carriageway, directly to the north of the Scheme.

3.1.16. On this basis, the alignment is now set to the east of the existing carriageway.

3.2 ALTERNATIVE DESIGN CONSIDERATIONS

3.2.1. As part of the EIA, alternative design options will be considered and the findings reported in the ES. This assessment will be undertaken in accordance with the Design Manual for Roads and Bridges (DMRB) Volume 11 Section 2, Part 5 Assessment and Management of Environmental Effects. The assessment of alternatives would include consideration of technology, design, size, scale, demand, delivery, scheduling and mitigation, as appropriate. Options for these elements would be appraised to determine potential significant environmental effects, and ultimately inform the Scheme (e.g. location of Charlton Mires junction). Particular attention has and will be given to the potential effects of the Scheme on the Scheduled Monuments within and abutting the red-line boundary. Alternative design considerations will be reported in the ES.

4 CONSULTATION

4.1 PREVIOUS CONSULTATION

4.1.1. An early public engagement exercise was undertaken in May 2016 in association with the Options Identification Stage, in order to obtain feedback which would aid the development and consideration of the options.

4.1.2. Non-statutory consultation took place between November and December 2016 where the public and other stakeholders were given the opportunity to comment on the Orange Option proposal.

4.1.3. Six consultation events were held in Morpeth, Alnwick, Belford and Berwick-upon-Tweed, at which the Scheme and environmental information was presented and expert staff were on hand to answer questions. Information about the proposed option and the feedback form was also available on the Highways England website (**www.highways.gov.uk/A1inNorthumberland**), and was sent to stakeholders and residents close to the Scheme. The consultation was advertised in the local press.

4.1.4. Following consultation, a total of 473 responses were received with 41 being specific to the Scheme. Responses were received from a broad range of residents, with most respondents being frequent users of the A1 in Northumberland. Nearly all respondents were car drivers and lived in the local area.

4.1.5. Nearly half of respondents (49%) agreed with the Scheme, five percent disagreed and the rest said they neither agreed nor disagreed (18%), did not know (11%) or did not answer the question (18%). The Scheme was seen as improving safety or reducing accidents (18 mentions) and improving traffic management or flow (14 mentions).

4.2 PROPOSED CONSULTATION

4.2.1. As required by section 47 of the PA2008 Highways England will prepare a Statement of Community Consultation (SoCC) that is currently due for publication in early 2019. The SoCC will outline how Highways England intends to formally consult with the local community about the Scheme. Highways England will first consult the relevant local authorities on the draft SoCC.

4.2.2. Preliminary Environmental Information (PEI), which will take account of the Inspectorate Scoping Opinion received, will be provided for statutory consultation which is proposed to take place in early 2019.

4.2.3. Responses received during statutory consultation will be carefully considered and taken into account in the development of the Scheme, in accordance with section 49 of the PA2008. This will be detailed in the Consultation Report submitted with the DCO application. The Consultation Report will demonstrate how Highways England has complied with the consultation requirements of the PA2008.

ENVIRONMENTAL CONSULTATION

4.2.4. In October 2018, Highways England notified the Inspectorate that the Scheme is EIA development under Regulation 8(1)(b) of the EIA Regulations, and that it proposes to submit an ES as part of the DCO application. Following receipt of this notification the Inspectorate will have notified the consultation bodies that Highways England intends to provide an ES for the Scheme. The Inspectorate will also have notified the consultation bodies of their duties under regulation 9(3) of the EIA Regulations. The Inspectorate provided Highways England with a list of the notified consultation bodies and any regulation 9(1)(c) persons (other interested parties), and any non-prescribed consultation bodies, if appropriate.

4.2.5. Highways England will use this list to inform who they will consult during their statutory consultation under section 42 of the PA2008. Information and views obtained from this consultation will inform the EIA.

4.2.6. The following consultees have been contacted prior to the submission of this Scoping Report, and any initial comments have been addressed, where received and appropriate, in this Scoping Report:

- Northumberland County Council (NCC) County Archaeologist in relation to the cultural heritage assessment and evaluation methodology;
- Historic England in relation to the cultural heritage assessment and Scheduled Monument in the vicinity of the Scheme;
- Environment Agency in relation to the Road Drainage and Water Environment assessment;

- Lead Local Flood Authority (LLFA) in relation to the Road Drainage and Water Environment assessment;
- NCC Environmental Health Officer (EHO) in relation to the Noise and Vibration as well as Soils and Geology assessment; and
- Natural England in relation to the Regionally Important Geological Sites.

4.2.7. During the EIA, it is proposed that the following stakeholders will be consulted. This list may be subject to change and would be further informed by the list of the notified consultation bodies identified by the Inspectorate. This list goes beyond the requirements of section 42 of PA2008:

- British Horse Society;
- Northumberland Wildlife Trust;
- Environment Agency;
- NCC:
  - Archaeologist;
  - Ecologist;
  - Environmental Health Officer (EHO);
  - Lead Local Flood Authority (LLFA) officer; and
  - PRoW officer;
- Historic England;
- Natural England;
- The Forestry Commission;
- The Ramblers; and
- Sustrans.

5 APPROACH TO ENVIRONMENTAL ASSESSMENT

5.1 SURVEYS AND PREDICTIVE TECHNIQUES AND METHODS

5.1.1. Each individual topic specific section presents details of data collection and survey work that has been undertaken to inform this Scoping Report. Furthermore, each section sets out the further work proposed to be undertaken to inform the ES.

5.2 GENERAL ASSESSMENT ASSUMPTIONS AND LIMITATIONS

5.2.1. Topic specific limitations and assumptions are set out in the relevant sections of this Scoping Report. The following key limitations apply to a number of topic areas:

- This Scoping Report is based on currently available information (including the lack of complete ecological surveys), and will be subject to change as the design progresses;
- Traffic data produced for preliminary design is not currently available; and
- The Scheme Footprint currently includes space for more than one option for attenuation ponds, PRoW diversions and variation in the location of Charlton Mires Junction and Broxfield Bridge. As such it is likely to be more extensive than the final Scheme Footprint that will be set out in the final ES.

5.2.2. The following assessment years are assumed for the purposes of this Scoping Report:

- Baseline Year (2018);
- Opening Year (2023); and
- Future Year (2038).

5.3 APPROACH TO THE ASSESSMENT AND SIGNIFICANCE CRITERIA

5.3.1. The DMRB, including any Interim Advice Notes (IAN), will be used as the main source of guidance, with relevant discipline specific guidance used as appropriate. In particular guidance contained in DMRB Volume 11 Environmental Assessment will be used. DMRB Volume 10 which contains guidance on Environmental Design and Management will also be used to inform topic areas as appropriate.

5.3.2. The approach to assessment has been based on the guidance in DMRB Volume 11 Section 2 Part 5 (HA205/08) (**Ref. 5.1**) Assessment and Management of Environmental Effects.

5.3.3. DMRB Volume 11, Interim Advice Note 125/15 Environmental Assessment Update (**Ref. 5.2**) advises on the environmental topics to be included in the environmental assessment and the method to be used for each assessment. However, as there has been a change to the EIA regulations since its publication, this Scoping Report provides information on the following topic areas:

- Air Quality;
- Noise and Vibration;
- Landscape and Visual;
- Cultural Heritage;
- Biodiversity;
- Road Drainage and the Water Environment;
- Geology and Soils;
- Population and Health;
- Materials Assets and Waste;
- Climate (included as a topic to adhere to the EIA Regulations); and
- Cumulative Effects

5.3.4. In accordance with the DMRB Volume 11, Section 2 Part 5 (HA205/08) the assessment will cover the likely significant effects arising from the permanent and temporary, direct, indirect, secondary, cumulative, short, medium and long-term, beneficial and adverse impacts of the Scheme.

5.3.5. The significance of an effect is determined by looking at what the changes would be against the existing, or predicted, baseline as a result of both the construction and operation of the Scheme, and combining the value (or sensitivity) of a receptor with the magnitude (degree of change) of the predicted effect upon that receptor.

The greater the environmental sensitivity or value of the receptor or resource, and the greater the magnitude of impact, the more significant the effect. Volume 11 Section 2, Part 5 of the DMRB (specifically Tables 2.1, 2.2, 2.3 and 2.4) provides advice on typical descriptors of environmental value, magnitude of change and significance of effects. It is normal practice to state that impacts of moderate or above significance are regarded as significant impacts.

5.3.6. The approach to the assessment of each of these topics is detailed in the relevant sections of this Scoping Report.

HEAT AND RADIATION

5.3.7. Schedule 4 Part 5 of the EIA Regulations details the requirement for a description of the likely significant effects on the environment resulting from, amongst others, the emission of heat and radiation.

5.3.8. Due to the scale and nature of the Scheme, it is not anticipated that there will be any significant sources of heat or radiation either during construction or operation of the road. The consideration of heat and radiation emissions has therefore been scoped out of the assessment and has not been considered further in this Scoping Report.

HEALTH

5.3.9. Schedule 4 Part 5 of the EIA Regulations details the requirement for a description of the likely significant effects on the environment resulting from, amongst others, the risks to human health.

5.3.10. There is no consolidated methodology or practice for the assessment of health in EIA. However, the scope of the assessment is considered to be covered by the **Chapter 13 - Population and Health** of this Scoping Report. The Population and Health chapter draws on existing Highways England Guidance and the Major Projects Instruction guidance as set out below. This recognises the specific requirements of the National Policy Statement for National Networks (NPS NN) for consideration of health, specifically within paragraphs 4.79-4.82 (**Ref. 5.3**). The guidance is as follows:

- Pedestrians, cyclists, equestrians and community effects (DMRB Volume 11 Section 3 Part 8);
- Vehicle Travellers (DMRB Volume 11 Section 3 Part 9);
- Air Quality (HA 207/07, IAN 185/15, IAN 175/13, IAN 174/13, IAN 170/12);
- Noise and Vibration (HD 213/11, IAN 185/15); and
- Road Drainage and The Water Environment (HD 45/09).

5.3.11. In addition to the guidance detailed above, emerging best practice, professional judgement and experience, and established research will inform the methodology for health. In addition, where human health effects are identified, these effects will be incorporated into both the combined and cumulative effects assessment.

MAJOR ACCIDENTS AND HAZARDS

5.3.12. Schedule 4 Part 5 of the EIA Regulations details the requirement for a description of the likely significant effects on the environment resulting from, amongst others, the risks to human health, cultural heritage or the environment (for example due to disasters).

5.3.13. The assessment of major accidents and disasters, hereafter referred to as "major events", as required by the EIA Regulations should cover:

- Vulnerability of the project to risks of major accidents and or/disasters; and
- Any consequential changes in the predicted effects of that project on environmental topics.

Definitions

5.3.14. In the absence of a current industry definition of major events in the context of EIA, the following definitions have been used to inform the identification of potential major events related to the Scheme.

5.3.15. The Control of Major Accidents and Hazards (COMAH) 2015 (**Ref. 5.4**) Regulations define major accidents as follows:

"*Major accident means an occurrence such as a major emission, fire, or explosion … leading to serious danger to human health or the environment*."

5.3.16. Serious danger to human health means a risk of death, physical injury or harm to health, e.g.: (a) a substantial number requiring medical attention; (b) some people seriously injured, requiring prolonged treatment.

5.3.17. Serious danger to the environment includes accidents with the potential to result in:

- The death or adverse effects on local populations of species or organisms, with lower thresholds for high-value or protected species;
- Contamination of drinking water supplies, ground or groundwater;
- Damage to designated areas, habitats or populations of species within the areas;
- Damage to listed buildings;
- Damage to widespread habitats; and
- Damage to the marine or aquatic environment.

5.3.18. The United Nations Office for Disaster Risk Reduction defines disaster as follows:

"*A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.*"

5.3.19. As such, major accidents and disasters are very closely linked. They can be natural or man-made and may include:

- Severe weather e.g. floods; earthquakes, hurricanes, storms, drought, tsunamis, extremes of temperature – hot and cold;
- Transport accidents e.g. rail accidents, motorway pileups, plane crash;
- Industrial e.g. explosions, pollution, fire;
- Terrorism;
- Disease outbreaks; and
- Electricity, gas, water supply or sewerage system failures.

Guidance

5.3.20. There is currently no published guidance on the assessment of major events within the context of EIA. However, the assessment will take account of existing good practice and guidance such as Defra (2011) 'Guidelines for Environmental Risk Assessment and Management (**Ref 5.5**) and the Cabinet Office's 'National Risk Register of Civil Emergencies' (**Ref 5.6**).

Sensitive Receptors

5.3.21. The following receptors are likely to be considered, but could change as the EIA progresses:

- Members of the public and local communities;
- Infrastructure and the built environment;
- The natural environment, including ecosystems, land and soil quality, air quality, surface and groundwater resources and landscape;
- The historic environment, including archaeology and built heritage; and
- The interaction between the factors above.

Assessment Methodology

5.3.22. The assessment will consider the construction and operation (including maintenance) of the Scheme.

5.3.23. In order to define the sensitive receptors and the Scheme's vulnerability to a major event, baseline data will be collated from other relevant environmental topics within the ES, in particular Climate, Population and Health, Biodiversity, Geology and Soils and Road Drainage and the Water Environment. Furthermore, a review of risk registers for the Scheme will be undertaken to inform the baseline. The baseline will comprise:

- Features external to the Scheme that contribute a potential source of hazard to the Scheme (for example flood risk areas);
- Sensitive environmental receptors at risk of significant effect; and
- Current (without the Scheme) major accident and disaster risks (for example flooding and traffic collision risks).

5.3.24. The methodology will include three main stages, as follows:

Stage 1: Develop a long list of all possible major events within a 5 km study area (based upon professional judgement). This list will draw upon a variety of sources, including the UK Government's Risk Register of Civil Emergencies. This stage will also include an initial review of potential sensitive receptors. This long list will be developed based upon professional judgement in consultation with Highways England, together with the site

location, study area, nature of the Scheme, likelihood of occurrence, surrounding land uses and Scheme risk registers.

Stage 2: Undertake a screening exercise to review the long list of major events and to 'screen out' any major event not relevant to the Scheme. All major events that do not have a source: pathway; receptor will be screened out. Those screened in will be taken forward for further assessment as a short list of major events.

Stage 3: Consider mitigation and design measures that could reduce the vulnerability of the Scheme to major events. Where mitigation is unable to remove the potential interaction between a major event and a specific environmental topic, the relevant topic specific ES chapter will identify the potential consequence for receptors covered by the topic, and give a qualitative evaluation of the significance of effect as a result of a major event.

5.3.25. The significance of effects will be based upon professional judgement and will consider:

- Geographic extent of the effects;
- Duration of the effects (effects which are permanent [i.e. irreversible] or long lasting will be considered significant);
- Severity of the effects in terms of number, degree of harm to those affected and the response effort required (effects that trigger the mobilisation of substantial civil emergency response effort are likely to be considered significant);
- Sensitivity of the identified receptors; and
- Effort required to restore the affected environment (effects requiring substantial clean-up or restoration efforts are likely to be considered significant).

5.3.26. All major events identified at Stage 2 will be included on the Scheme Risk Register, unless closed out through design. The findings of the assessment will form a technical appendix to the ES that will be cross-referenced within the relevant technical chapters.

TRANSBOUNDARY EFFECTS

5.3.27. Schedule 4 Part 5 of the EIA Regulations requires a description of the likely significant transboundary effects to be provided in an ES.

5.3.28. The nearest European Economic Area (EEA) State to the Scheme is Ireland, located approximately 350 km west of the Scheme.

5.3.29. It is considered that the Scheme would not generate significant effects upon any other EEA States, as reported in the Screening Matrix (Planning Inspectorate Advice Note 12, December 2015 (**Ref. 5.7**)) in **Appendix B**. Transboundary effects are therefore scoped out of the ES.

5.4 DUPLICATION OF ASSESSMENT

5.4.1. In accordance with the EIA Regulations, the ES will contain information of how it has been prepared, particularly with reference to how duplication between individual environmental topic assessments has been avoided. Furthermore, it will contain reference to how duplication between different assessments (including, for example, the ES, Habitat Regulations Assessment (HRA) Screening and the Flood Risk Assessment (FRA)) has been avoided.

5.5 ENVIRONMENTAL STATEMENT

5.5.1. The ES for the Scheme is likely to comprise of three Volumes as follows:

- Volume 1: Non-Technical Summary;
- Volume 2: Environmental Statement; and
- Volume 3: Figures and Technical Appendices.

5.5.2. The main ES (Volume 2) will be a concise document that is appropriate and proportionate to the Scheme. Technical or supporting documents will, where appropriate, be contained in Volume 3 so that the main ES provides clear and focussed information.

5.5.3. The anticipated structure of Volume 2 of the ES is as follows (although may be subject to change):

- Introduction;

- The Scheme;
- Assessment of Alternatives;
- Consultation;
- Environmental Assessment Methodology;
- Individual chapters for each environmental topic scoped into the assessment;
- Assessment of Cumulative Effects;
- Summary;
- References; and
- Abbreviations and Glossary.

6 AIR QUALITY

6.1 INTRODUCTION

6.1.1. This Chapter considers the implications of the Scheme on local and regional air quality during the construction and operational phases and any potential significant effects. It sets out the proposed methodology for the air quality assessment and identifies those impacts that can be scoped out of the EIA.

6.1.2. This Chapter has been informed by the results of the Options Identification and Options Selection Stage environmental assessments and the methodology set out in DMRB HA207/07 (**Ref 6.1**) and associated Interim Advice Notes.

6.1.3. The NPS NN (2014) (**Ref. 6.2**) requires that the air quality impacts of a scheme are assessed in relation to relevant statutory air quality thresholds set out in domestic and European legislation. In particular, detailed consideration should be given to impacts within or adjacent to AQMAs, roads identified as exceeding, or being at risk of exceeding, EU Limit Values or sites designated for nature conservation.

6.1.4. This Chapter should be read together with the introductory chapters of this Scoping Report (**Chapters 1 - 5**) as well as **Chapter 16 – Assessment of Cumulative Effects**.

6.2 STUDY AREA

6.2.1. The study area for the construction impacts will include areas within 200 m of the Scheme boundary for the duration of the build (including the construction compounds at the Lionheart Enterprise Park and Main Compound, located at Westmoor Junction, off Felton Road). The study area for operational impacts will be determined by analysis of the Preliminary Design Stage traffic data (not available at the time of writing) within the Traffic Reliability Area (TRA) to identify the affected roads network (ARN).

6.2.2. The criteria for defining the ARN as set out in DMRB HA207/07 are:

- Road alignment will change 5 m or more;
- Daily traffic flows will change by 1,000 Annual Average Daily Traffic (AADT) flows or more;
- Heavy Duty Vehicle (HDV) flows will change 200 AADT or more;
- Daily average speed will change by 10 km/h or more; and
- Peak hour speed will change by 20 km/h or more.

6.2.3. For the regional assessment, the criteria that defines the affected roads are:

- A change of more than 10% in AADT;
- A change of more than 10% in the number of HDVs; or
- A change in daily average speed of more than 20 km/hr.

6.2.4. For operation, the study area consists of a 200 m corridor either side of all roads in the ARN.

6.3 BASELINE CONDITIONS

6.3.1. Baseline air quality has been assessed with reference to the following data sources:

- Local Air Quality Management (LAQM) reporting undertaken by NCC between 2013 and 2015;
- National modelling undertaken by Defra using the Pollution Climate Mapping (PCM)
- model;
- Nitrogen deposition and nitrogen oxides modelling provided by the online Air Pollution Information System (APIS) for ecological sites; and
- Scheme-specific nitrogen dioxide diffusion tube monitoring undertaken between February 2017 and July 2017.

LOCAL AUTHORITY MONITORING

6.3.2. NCC undertake air quality monitoring across the region as part of the Local Air Quality Management regime. As a result of this monitoring and the findings of previous NCC Air Quality Review and Assessments, Progress Reports and Annual Status Report, NCC has not declared any AQMAs within its boundary. As such, no part of the Scheme is located within an AQMA, nor do any of the potential routes that may be affected by the Scheme lie within an AQMA.

6.3.3. NCC undertake air quality monitoring using a combination of automatic (continuous) and passive (diffusion tube) techniques. There have been no exceedances of the relevant objectives at any monitored location within the past five years in the NCC area.

6.3.4. The closest NCC administered monitoring site is located at Alnwick (Site 8N, approximately 2.3 km south-west of the main Scheme, approximately 1.7 km north of the construction compound at the Lionheart Enterprise Park). **Table 1** summarises the monitoring results within their administrative area for the last three available years.

Table 1 NO_2 Monitoring results within Northumberland County

ID	Location Name	Annual Mean NO_2 Concentration ($\mu g/m^3$)		
		2013	2014	2015
CR	Cowpen Road	27	24	25
8N	Bondgate Without, Alnwick	28	30	30
B1	Waterloo Road, Blyth	29	27	29
B3	Cowpen Rd. West, Blyth (Coloc)	33	32	32
B5	Cowpen Rd. East, Blyth	24	24	23
B11	Blyth YMCA, Blyth	25	26	26
B12	Bridge St, Blyth	25	24	24
B15	South Newsham Road	21	20	19
C1	High Pit Road, Cramlington	24	25	23
C9	Trebor, Cramlington	21	22	20
C10	Bay Horse (B1505)	28	27	23
C11	Storey Street (B1505)	19	22	19
CM2	Newgate St, Morpeth	22	23	19
CM4	Bridge St, Morpeth	28	26	22
CM5	Thorpe Ave, Morpeth	-	-	21
CM6	Telford Bridge, Morpeth	-	-	25
CM7	Greystoke Cottage, Clifton			26
W17	Front Street East, Bedlington	27	28	20
W21	Newbiggin Road, Ashington		21	24
SD1	Salvation Army, Seaton Delaval	26	25	25

6.3.5. There were no exceedances of the Air Quality Objective for annual mean NO_2 at any monitoring location within the county in the past three years.

6.3.6. NCC also monitors PM_{10} at two locations in the region: the Cowpen Road and Blyth Library sites. Both sites are located over 30 km south of the Scheme (over 20 km south of the shared construction compound near West Thirston) and as such provide indicative information on regional ambient concentration of PM_{10}. **Table 2** summarises the results of the last three years of monitoring.

Table 2 PM_{10} Monitoring results within Northumberland County Council

Site ID	Name	PM_{10} Annual Mean Concentration (µg/m3)		
		2013	2014	2015
BL	Blyth Library	35	15	13
CR	Cowpen Rd	25	14	14

6.3.7. There were no exceedances of the Air Quality Objective for annual mean PM_{10} at any monitoring location within the county in the past three years.

BACKGROUND CONCENTRATIONS

6.3.8. The Pollution Climate Mapping (PCM) model is a collection of models designed to fulfil part of the UK's EU Directive requirements to report on the concentrations of particular pollutants in the atmosphere. The pollutants reported on through the PCM include NOx, NO_2, PM_{10} and $PM_{2.5}$ for a 1 x 1 km grid of background conditions plus around 9000 roadside values. The PCM model is also used for scenario assessment and population exposure calculations as well as to produce mapped data of background pollutant concentrations.

6.3.9. PCM data for 2015 are available from Defra's UK-Air website (**Ref 6.3**). The nearest PCM model link is 28 km south of the Scheme in Morpeth. The data indicates that roadside concentrations are less than 31µg/m^3 for annual mean NO_2, which is well below the EU Limit Value. Future year concentrations are even lower, reducing the risk of non-compliance with the EU Limit Values even further.

6.3.10. Background concentrations for the grid squares covering the Scheme have been collated and summarised in the **Table 3** below. Background pollutant concentrations of NO_x, NO_2, PM_{10} and $PM_{2.5}$ for base year (2017), and an opening year of 2023 (**Ref. 6.3**). All the annual mean background concentrations are well below the relevant limit values.

Table 3 Annual Mean Background Concentrations from Defra mapped data for 2017 and 2023

Year	Nitrogen Oxides	Nitrogen Dioxide	Particulate Matter PM_{10}	Particulate Matter $PM_{2.5}$
Limit Value (µg/m^3)	30	40	40	25
Total Pollutant Concentrations (µg/m^3)				
2017	5.94	4.65	10.99	6.78
2023	4.83	3.81	10.75	6.57

6.3.11. Average concentrations of all pollutants are well below the relevant limit values. The difference between the background concentrations with and without road-contribution is small, which suggests other pollutant sources have a larger influence on pollutant concentrations in the vicinity of the Scheme.

SCHEME SPECIFIC MONITORING

6.3.12. Scheme specific monitoring was undertaken using NO_2 diffusion tubes, between February 2017 and July 2017 at eight sites within or near the study area, see **Table 4**. Concentrations of NO_2 along the A1 were well below the annual mean NO_2 air quality objective threshold. The maximum measured annual mean concentration was 12µg/m^3.

Table 4 Summary of the diffusion tube locations and the monitoring concentrations

ID	Location			Distance to A1	Annual Mean NO_2 2016 Concentration
	X	Y	Z	(m)	(µg/m^3)*
B1	416924	622976	2.6	30	9.1
B2	417144	621909	2.8	56	10.8
B3	417396	621297	2.5	35	6.9
B4	417755	620610	2.6	38	11.9
B5	417802	620014	2.5	96	9.7
B6	418139	618240	2.6	421	7.2
B7	420094	616686	2.6	920	7.2
BG	421041	616322	0.9	N/A†	5.4

* Bias adjusted results using national factor of 0.91
† Site selected to represent the local background concentrations so is applicable across the entire area

ECOLOGICAL RECEPTORS

6.3.13. There are no nationally or internationally designated sites with 200 m of the Scheme. The assessment of ecological receptors will be re-visited upon review of the ARN where affected links may be adjacent to sensitive ecological receptors.

6.4 POTENTIAL IMPACTS

6.4.1. The potential impacts during the construction of the Scheme are likely to be temporary with increased dust and particulate matter (PM_{10}) generation due to activities on site and at the construction compounds both at the Lionheart Enterprise Park and near West Thirston. In addition, vehicle emissions resulting from construction vehicle movements on site, as well as those to and from the construction compounds, have the potential to affect ambient pollutant concentrations.

6.4.2. The potential significant effects as a result of the operation of the Scheme are anticipated to comprise:

- Potential change in pollutant concentrations (notably NO_2) due to exhaust emissions from road traffic generated during the operational phase of the Scheme; and
- Potential increase in nitrogen deposition on sensitive designated ecological sites above the critical load as a result of increased traffic capacity should the ARN include a SSSI / SAC / SPA / Ramsar site within 200 m.

6.5 DESIGN, MITIGATION AND ENHANCEMENT MEASURES

6.5.1. As noted previously, best practice mitigation will be required to control dust and emissions from construction works and plant. These measures will be set out in the Scheme Construction Environmental Management Plan (CEMP).

6.5.2. Any requirements for consideration of air quality within the specification of traffic management measures during construction will be determined as the Scheme design progresses.

6.5.3. No Scheme specific mitigation or Scheme Air Quality Action Plans are likely to be required for the operation of the Scheme.

6.6 DESCRIPTION OF THE LIKELY SIGNIFICANT EFFECTS

6.6.1. No significant air quality effects are anticipated with mitigation in place, subject to the update of revised traffic data and modelling.

6.7 ASSESSMENT METHODOLOGY

TOPICS AND ELEMENTS OF TOPICS TO BE SCOPED IN AND OUT

6.7.1. The Options Selection Stage assessment did not assess the potential construction effects as a result of the Scheme. Whilst existing ambient particulate matter concentrations are likely to be very low, the likely temporary nature of potential construction impacts, along with application of mitigation measures set out in a CEMP, significant impacts are not considered likely. In order to ensure that all potential effects during construction are captured, including works on site and construction vehicle movements including those to and from construction compounds, it is proposed that this element is **scoped in** for the EIA.

6.7.2. The operation of the Scheme has the potential to change traffic volumes and speeds on the public road network. Whilst no significant effects were assessed at the Options Selection Stage assessment, a revision to the traffic model (due to the Options Selection Stage data comprising both Section A, Morpeth to Felton, and Section B, Alnwick to Ellingham, of the A1 Northumberland improvements) is currently being undertaken. It is therefore proposed that the assessment of operational traffic on local and regional air quality is **scoped in**, and assessed with a **Simple Level** assessment as defined in DMRB (HA 207/07), with a focus on a small number of receptors in the areas with the greatest change in vehicle flows as a result of the Scheme.

6.7.3. In relation to highways schemes and emissions from vehicular traffic, the pollutants of greatest concern are oxides of nitrogen and particulate matter. The focus of the assessment will be the impacts on oxides of nitrogen and particulate matter (PM_{10}) since these are the pollutants where vehicle emissions are the most likely to give rise to pollutant levels near to or above air quality limit values.

6.7.4. Whilst there are no ecological receptors within 200 m of the Scheme, there may be ecological receptors within 200 m of the ARN. Therefore, the assessment of ecological receptors will be screened on receipt of the ARN. Therefore, this assessment is **scoped in** to the ES.

6.7.5. A **Simple Level** assessment as set out in HA 207/07 will be undertaken to demonstrate that the revised traffic data leads to no significant impacts. The evidence will be presented as part of the ES. Should potential significant impacts be identified as part of the **Simple Level** assessment, a **Detailed Level** assessment shall be undertaken.

LEGISLATION, POLICY AND GUIDANCE

6.7.6. Policy and plans relevant to the Scheme will be considered within the ES and will consist of the following elements:

- Relevant national, regional, county and local policies; and
- A commentary setting out the significance of the impact of the Scheme on each policy objective.

6.7.7. The NPS NN sets out the Government's policies to deliver the development of NSIPs on the national road and rail networks. Paragraph 5.12 and 5.13 provide advice to the decision maker to be used when determining whether a scheme should receive consent:

"the Secretary of State must give air quality substantial weight where, after taking into account mitigation, a project would lead to a significant air quality impact in relation to EIA and / or where they lead to a deterioration in air quality in a zone / agglomeration.

The Secretary of State should refuse consent where, after taking into account mitigation, the air quality impacts of the scheme will:

- *Result in a zone / agglomeration which is currently being reported as being compliant with the Air Quality Directive becoming non-compliant; or*
- *Affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported to the European Commission at the time of the decision"*

6.7.8. In order to provide all required information to in the decision maker, the **Simple Level** assessment will determine the significance, or lack thereof, of potential air quality impacts in the study area. In addition, a

comparison of predicted pollutant concentrations against Air Quality Directive limit values will be undertaken in order to demonstrate the compliance of zones / agglomerations within the study area. The methodology set out in IAN 175/13 (**Ref 6.4**) will be used to assess the implications of the Scheme for EU Limit Value compliance in conjunction with the Defra Pollution Climate Mapping model.

METHODOLOGY

6.7.9. During the construction phase, the assessment of direct construction impacts i.e. from earthworks, on-site plant and stockpiling etc, will be undertaken as a qualitative desk study as set out in HA207/07. The assessment will include identification of sensitive receptors within 200 m of construction activities within the Scheme Footprint and the identification of potential site-specific mitigation measures. In addition, a qualitative assessment of construction related vehicle movements, including those to and from the off-site construction compounds, and the effect of traffic management measures will be undertaken.

6.7.10. During the operational phase, the initial step will be to undertake a scoping level assessment as set out in HA207/07, to determine the extent of the ARN to define the study area for operational impacts.

6.7.11. Further work on the air quality impacts of the Scheme will be undertaken as a **Simple Level** assessment, as set out in HA207/07. A **Simple Level** assessment is proposed due to the low risk of exceedance of the air quality limit values and low risk of potentially significant effects as identified in the assessments previously undertaken at the Options Selection Stage. As previously stated, should potential significant impacts be identified as part of the **Simple Level** assessment, further calculations will be carried out to determine the first year in which the criteria would be achieved, and a **Detailed level** assessment undertaken.

6.7.12. Atmospheric Dispersion Modelling System (ADMS) Roads is a computer-based model of dispersion in the atmosphere released from road traffic and industrial sources. ADMS Roads will be used to calculate pollutant concentrations at sensitive receptor locations in the study area using 24 hr AADT traffic data compiled as part of the Transport Assessment for the Scheme. Pollutant concentrations will be calculated at properties within 200 m of the ARN in areas with the greatest change in vehicle flow as a result of the Scheme, as well as properties which are likely to have the highest pollutant concentrations in the area.

6.7.13. The base year model results will then be compared with measured concentrations as collected in the Scheme specific diffusion tube survey and adjusted as necessary in accordance with Defra's Technical Guidance TG (16) (**Ref. 6.5**). The adjusted modelled concentrations will then be compared with the air quality criteria.

6.7.14. The methodology takes into account the following Interim Advice Notes (IANs):

- IAN 170/12v3 (**Ref 6.6**) Updated Air Quality Advice on the Assessment of Future NOx and NO_2 projects for users of DMRB Volume 11, Section 3 Part 1 'Air Quality';
- IAN 174/13 (**Ref 6.7**) Updated Advice for Evaluating Significant Local Air Quality Effects for DMRB Volume 11, Section 3, Part 1 'Air Quality';
- IAN 175/13 (**Ref 6.4**) Updated Air Quality Advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for users of DMRB Volume 11, Section 3 Part 1 'Air Quality'; and
- IAN 185/15 (**Ref 6.8**) Updated Traffic, Air Quality and Noise Advice on the Assessment of Link Speeds and Generation of Vehicle Data into 'Speed bands' for Users of DMRB Volume 11, Section 3, Part 1 'Air Quality'; and Volume 11, Section 3, Part 7 Noise.

6.7.15. IAN 170/12 includes projection factors for annual mean NO_2 and NO_X concentrations between 2008 and 2030, which were updated by Highways England in May 2015. These updated factors reflect the latest predicted long-term trends from the introduction of Euro 6/VI (termed LTTE6).

6.7.16. IAN 174/13 provides updated advice on evaluating the significance of local air quality effects in line with the requirements of the existing EIA Directive for Highways England schemes. It includes the assessment of significant local air quality effects for public exposure and designated ecosystems only.

6.7.17. IAN 175/13 has been withdrawn pending issue of updated advice. However, in the absence of published updated advice, IAN 175/13 will be used to assess the impact of the Scheme on compliance with the EU Directive on ambient air quality for the EIA.

6.7.18. IAN 185/15 includes vehicle emission rates for NOx, PM_{10} and CO_2, for use in air quality assessments, which were updated by Highways England in November 2016. These updated factors reflect the latest available vehicle emissions testing data. Barring any update, these factors will be used in the EIA.

Operational Phase

6.7.19. HA207/07 states that "the worst year in the first 15 years from opening needs to be assessed" in relation to local air quality. For the Scheme, this covers any year between 2023 and 2038, although it is generally assumed to be the opening year of the Scheme. With the assessment being set at a **Simple Level**, the future year impacts will not be assessed as it is assumed that the opening year will be the worst.

6.7.20. The local air quality assessment will consider the following scenarios:

- Baseline Year (2015);
- Opening Year (2023) - Do Minimum; and
- Opening Year (2023) - Do Something.

6.7.21. The regional assessment will consider the following scenarios:

- Opening Year (2023) and Future Year (2038) - Do Minimum; and
- Opening Year (2023) and Future Year (2038) – Do Something.

6.7.22. Traffic data to be input into ADMS Roads will be used to derive emission rates for each road link. Vehicle emissions will be taken from HA IAN 185/15.

6.7.23. In order to account for the uncertainty in forecast vehicle emission rates and the real-world performance of vehicles, the gap analysis methodology set out in HA IAN 170/12 will be used as a correction to future year concentrations.

6.7.24. The methodology set out in HA IAN 175/13 will be used to assess the implications of the Scheme for EU Limit Value compliance in conjunction with the Defra PCM model.

6.7.25. The assessment will also consider potential impacts at sensitive ecological receptors identified as likely to be impacted by the Scheme, as set out in HA207/07 Annex F.

Human Health

6.7.26. HA 207/07 states that compounds released into the atmosphere by road vehicles are involved in a variety of health and environmental effects over different time periods, and on different geographical scales. This assessment will consider air quality with respect to the UK Air Quality Strategy, which covers ten pollutants, along with the strategy's objective to reduce the pollutant and the European Directive target value. Although no Scheme specific mitigation measures are likely to be required, best practice mitigation will be required to control dust and emissions from construction works and plant.

6.7.27. The assessment of likely significant effects on human health in relation to air quality is inherent in the health based objectives on which the assessment is based. These objectives have been established to protect individuals in a population, and as such they define the standard below which health effects are unlikely to be experienced even by the most sensitive members of the population. Above these, worse health outcomes may be predicted.

6.7.28. The human health findings of the assessment will, therefore be based on the criteria set out in IAN 174/13 Updated Advice for Evaluating Significant Local Air Quality Effects and will be summarised qualitatively in the assessment section of the Chapter. Where concentrations lie within the air quality objectives and an impact is determined not to be significant under IAN 174/13, there will be no significant health impacts.

6.7.29. Where human health effects are identified in this and any other topic, whether significant or not, these effects will be incorporated into the cumulative effects assessment of human health.

SIGNIFICANCE CRITERIA

6.7.30. The significance criteria contained within IAN 174/13 Updated Advice for Evaluating Significant Local Air Quality Effects for DMRB Volume 11, Section 3, Part 1 'Air Quality', will be used for the assessment of air quality.

6.7.31. The significance of effects upon ecological receptors will be determined in accordance with the HA207/07 Annex F. Value (Sensitivity)

6.7.32. HA207/07 does not explicitly refer to the concept of receptor value (sensitivity), nor does it define a value for receptors. The assessment is based on the selection of sensitivity receptors which are defined in LAQM.TG(16) (**Ref 6.5**). Sensitive receptors can include residential properties, schools and hospitals.

6.8 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

6.8.1. This Scoping Report is based on currently available information, and the approach can be subject to change as the design progresses.

6.8.2. The modelling of future air quality has associated uncertainties. In future years, one such uncertainty relates to the projection of vehicle emissions and in particular the rate at which emissions per vehicle will improve over time. The guidance set out in IAN 170/12 advises on the adjustment of modelled concentrations of NO_2 (and NO_X) to take account of recent trends on roadside pollutant concentrations and evidence on future vehicle emissions. However, current projections are only available until 2030, eight years before the end of the range of possible "worst year" assessment period set out in DMRB HA207/07. It is an assumption of this report that emission rates will remain constant during this period.

7 NOISE AND VIBRATION

7.1 INTRODUCTION

7.1.1. This Chapter considers the implications of the Scheme on noise and vibration during construction and operation and details any potentially significant effects. It sets out the proposed methodology for noise and vibration and identifies those impacts that can be scoped out of the EIA.

7.1.2. This section has been informed by the result of the Options Selection Stage noise assessment (**Ref 3.1**) and the methodology set out in DMRB HD 213/11 (**Ref 7.1**) and associated Interim Advice Note 185/11 (**Ref 7.2**).

7.1.3. This Chapter should be read together with the introductory chapters of this Scoping Report (**Chapters 1 - 5**) as well as **Chapter 16 – Assessment of Cumulative Effects**.

7.2 STUDY AREA

7.2.1. The study area for the operational noise and vibration assessment will be defined in accordance with the guidance provided in HD 213/11 which is as follows:

I. Identify the start and end points of the physical works associated with the Scheme;

II. Identify the existing routes that are being bypassed or improved, and any proposed new routes, between the start and end points;

III. Define a boundary 1 km from the carriageway edge of the routes identified in (ii) above;

IV. Define a boundary 600 m from the carriageway edge around each of the routes identified in (ii) above and 600 m from any other affected routes within the boundary defined in (iii) above. This area is called the “calculation area”;

V. Identify any affected routes beyond the boundary defined in (iii) above; and

VI. Define a boundary 50 m from the carriageway edge of the routes identified in (v) above.

7.2.2. An affected route is where there is a possibility of a change of 1 dB $L_{A10, 18hr}$ or more in the short-term (i.e. on opening) or 3 dB $L_{A10, 18hr}$ or more in the long-term.

7.2.3. The study area will ultimately be defined through details emerging from the revised traffic modelling and will, therefore, be based on a combination of the Scheme Footprint and the predicted change in traffic flows.

7.2.4. The above study area applies to the operational noise effects. Construction noise and vibration effects and operational vibration effects are expected to encompass a reduced study area which will, itself, be within the area defined for the operational noise effects.

7.2.5. The construction noise study area(s) will be determined based on a review of available information on the construction of the proposed Scheme, including construction programme, proposed working method statements, phasing diagrams, compound locations and working areas etc. Following this review, a sample of the closest and most sensitive receptors to the Scheme will be selected for the construction noise assessment.

7.2.6. The construction vibration study area(s) will be defined by identifying areas where intensive activities such as piling, ground stabilisation, demolition or extended periods of breaking out of hard ground may be required. The closest and most sensitive receptors to these areas will be identified and selected for the construction vibration assessment.

7.2.7. An operational vibration study area will be determined based on guidance contained within paragraph A1.35 of DMRB HD 213/11. This study area will be determined as a 40 m buffer around all affected routes identified in the determination of the 600 m noise calculation area.

7.3 BASELINE CONDITIONS

BASELINE NOISE SURVEY

7.3.1. A baseline noise survey was not undertaken for the Options Selection Stage EAR. Existing noise levels at receptors within the study area were established using predicted traffic data for the modelled opening year (2023), without the preferred route option in place. This may underestimate the overall noise levels at noise sensitive receptors in more rural locations away from busy roads with free-flowing traffic.

7.3.2. A baseline noise measurement survey will be undertaken for the assessment. Precise details, such as the extent and duration of the survey will be subject to consultation with NCC.

7.3.3. The proposed route passes through a rural area which is likely to have a relatively low existing baseline noise and vibration climate. As well as road traffic noise from the A1, other local roads in the area, such as the B6347, B6341 and B1340, are expected to dominate the existing noise and vibration environment for many sensitive receptors. The contribution of road traffic noise to existing baseline noise and vibration levels will be dependent on distance to roads, and the traffic flow, composition and speed on those roads.

7.3.4. The east coast mainline railway is located at a distance greater than 3 km to the east of the proposed Scheme and is not expected to influence noise levels in the area. Other than industrial facilities such as Lionheart Enterprise Park to the south of Alnwick within close proximity to the proposed Alnwick construction compound, there are minimal industrial / commercial noise sources, other than those associated with farming activities, which are expected to influence baseline noise levels within the vicinity of the site.

7.3.5. Although there is a small private airfield located to the west of the A1 within the vicinity of Charlton Mires Farm House it is expected that, given its proximity to the A1 which is the dominant noise source in this locality, the influence of air traffic noise on the baseline noise environment will be minimal.

7.3.6. In accordance with the DMRB HD 213/11, examples of sensitive receptors include dwellings, hospitals, schools, community facilities, designated areas (e.g. Areas of Outstanding Natural Beauty (AONB), National Park, SAC, SPA, SSSI, Scheduled Monuments), and PRoW. Sensitive receptors will be defined once the ARN is available.

NOISE IMPORTANT AREAS

7.3.7. The current Noise Action Plan (Defra, 2014) (**Ref 7.3**) outlines a number of Noise Important Areas (NIA) at Round 2 of the UK noise mapping project, identified in accordance with the requirements of the EU Environmental Noise Directive. The Round 2 NIA's denote the top 1% of the population, in terms of exposure to road traffic noise ($L_{A10, 18h}$).

7.3.8. The Round 2 NIA's for both Highways England and local authority maintained roads are available under the Open Government Licence (Defra, 2015) (**Ref 7.4**).

7.3.9. The closest NIA to the Scheme is NIA1001 located at approximately 2 km from the northern extent of the Scheme. It is expected that this will fall outside of the assessment study area. It is therefore expected that there will be no NIA's within the noise study area.

7.4 POTENTIAL IMPACTS

CONSTRUCTION EFFECTS

7.4.1. Overall, the proximity of likely sensitive receptors to the Scheme, allied to the scale and complexity of the works, means that there is potential for some disruption, albeit temporary, during the construction phase. This conclusion is reinforced due to the likely requirement for some night-time working. The potential effects associated with the construction of the Scheme are likely to include:

- The generation of noise and vibration from on-site activities during the construction phase potentially causing a disturbance to proximate sensitive receptors; and
- An increase in noise emissions from road traffic (during the construction phase), including that associated with the use of diversion routes, which may potentially cause a disturbance to proximate sensitive receptors.

OPERATIONAL EFFECTS

7.4.2. The potential adverse effects associated with operation of the Scheme are likely to include:

- The generation of operational road traffic noise, increased flows; and
- associated effect on local sensitive receptors adjacent to the proposed Scheme alignment.

7.5 DESIGN, MITIGATION AND ENHANCEMENT MEASURES

7.5.1. In line with the aim of government noise policy to minimise adverse impacts on health and quality of life as far as is sustainable, the magnitude of noise level change and the number of people adversely affected by them will seek to be minimised by noise mitigation integrated into the Scheme.

7.5.2. Where significant adverse changes in noise levels are predicted, consideration will be given to the potential for incorporating mitigation measures within the design of the Scheme with the aim of reducing noise impacts during the operational phase. Such mitigation would be subject to buildability and value for money considerations.

7.5.3. Appropriate mitigation will be determined once detailed assessments have been undertaken through the EIA. However, is likely to include the following:

7.5.4. CONSTRUCTION

- The use of silenced or sound reduced plant and equipment fitted with acoustic enclosures.
- Pneumatic tools to be fitted with silencers or mufflers.
- Deliveries to the Scheme site to be programmed, as far as possible, to arrive during daytime hours only.
- Delivery vehicles to be routed so as to minimise disturbance to local residents.
- All plant items to be properly maintained and operated according to manufacturer's recommendations in such a manner as to avoid causing excessive noise.
- All plant to be sited so that the noise impact at nearby noise sensitive properties is minimised.
- Local hoarding, screens or barriers to be erected as appropriate to shield particularly noisy activities.
- The adoption of a considerate and neighbourly approach to relations with the local residents including works only taking place during given periods.
- Measurement of noise levels at sensitive receptor locations during construction works.
- Best practice mitigation set out in the Scheme CEMP.

7.5.5. OPERATION

- The careful design of the alignment and cuttings.
- landscaped earthworks and installation of noise fence barriers at specific locations, where appropriate.
- As part of the design, low noise Thin Surface Course System (TSCS) would be incorporated where possible and appropriate.

7.5.6. The requirement for noise insulation works will also be considered through the EIA.

7.5.7. If any residential properties situated close to the Scheme qualify for noise insulation works under the Noise Insulation Regulations 1975 (as amended 1988), the combination of mitigation integrated into the Scheme (e.g. low noise surfacing and noise barriers) together with noise insulation would aim to avoid, as far as reasonably possible, significant observed adverse effects (i.e. avoid significant adverse impact on health and quality of life in line with government noise policy).

7.5.8. Further consideration to additional noise mitigation measures will be given should the assessment indicate significant adverse impacts during either the construction or operational phase.

7.5.9. Additional construction phase mitigation measures may involve the identification of possible suitable alternative working practices with the aim of minimising associated noise and/or vibration levels. Where considered necessary and appropriate, a programme of construction noise and/or vibration monitoring may be recommended.

7.6 DESCRIPTION OF THE LIKELY SIGNIFICANT EFFECTS

7.6.1. Potential significant effects will be explored in detail through the EIA with a view to minimising and, where necessary and possible, eliminating these potential significant effects.

7.6.2. The Scheme will be assessed as a whole against the aims of National Noise Policy as set out within the Noise Policy Statement for England (NPSE) (**Ref 7.11**). To allow assessment against National Noise Policy, the following descriptors will be used:

- No Observed Effect Level (NOEL)
- Lowest Observed Adverse Effect Level (LOAEL)
- Significant Observed Adverse Effect Level (SOAEL)

7.6.3. It should be noted that, a noise level above SOAEL does not automatically result in Significant Environmental Effect. Other factors including, but not limited to the following may also influence whether levels above SOAEL may result in Significant Environmental Effect:

- Predicted noise level change;
- Circumstances of receptors (e.g. where receptors have reduced sensitivity to noise due to good noise insulation, noise levels above a defined SOAEL may not result in Significant Environmental Effect at that receptor);
- Acoustic context;
- Likely perception of residents; and
- The duration for which a SOEL is reached or exceeded.

7.6.4. For construction noise or vibration, a significant environmental effect will be reported if it is above SOAEL thresholds for 10 days (or nights) or more in any 15, or for more than 40 days (or nights) in any six-month period.

7.6.5. For operational noise and vibration, the methodology presented within Section 3 of HD 213/11 will be used to define the magnitude of a predicted noise level change. The magnitude of change between the Do-minimum scenario in the baseline year against the Do-something scenario in the baseline year (short term) will be used as a starting point for determining significance of effect. Justification for the determined level of significance will be provided considering a number of contextual factors including, but not limited to, differing magnitude of change predicted in the long term compared to the short term, absolute noise level with reference to LOAEL and SOAEL, circumstances of receptors, acoustic context, likely perception of change by residents, and whether there are any designated sites which are predicted to be affected.

7.7 ASSESSMENT METHODOLOGY

TOPICS AND ELEMENTS OF TOPICS TO BE SCOPED IN AND OUT

7.7.1. No topics have been **scoped out** of the noise and vibration assessment.

7.7.2. The following elements are **scoped in** to the noise and vibration assessment:

- Temporary (i.e. construction noise and vibration) effects;
- Permanent traffic noise effects;
- Permanent traffic nuisance effects;
- Permanent traffic induced vibration effects (qualitative assessment); and
- Cumulative effects.

LEGISLATION, POLICY AND GUIDANCE

7.7.3. Legislation relevant to the Scheme will be presented in the ES and will consist of the following:

- Directive 2002/49/EC of the European Parliament – Assessment and management of environmental noise (better known as the Environmental Noise Directive – END) (**Ref 7.1**)
- Control of Pollution Act (**Ref 7.2**)
- Environmental Protection Act 1990 (**Ref 7.3**)
- Land Compensation Act 1973 (**Ref 7.4**)
- The Noise Insulation Regulations 1975 (as amended 1988) (**Ref 7.5**)
- Environmental Noise (England) Regulations 2006 (S.I. 2006/2238) (**Ref 7.6**)

- Department for Environment, Food and Rural Affairs (Defra), January 2014. Noise Action Plan: Roads (Including Major Roads) Environmental Noise (England) Regulations 2006, as amended (**Ref 7.7**).

7.7.4. The following policy and guidance will underpin the assessment and will be described in detail in the assessment:

- Highways Agency [now known as Highways England]. (2011). DMRB, Volume 11, Section 3 - Part 7 HD 213/11, Noise and Vibration (November 2011). London: Highways Agency (**Ref 7.8**).
- Highways Agency [now known as Highways England] (2015) Interim Advice Note 185/15 Updated traffic, air quality and noise advice on the assessment on link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11, Section 3, Part 1 'Air Quality and Volume 11, Section 3. Part 7 Noise (**Ref 7.9**).
- NPPF and Planning Practice Guidance (**Ref 7.10**);
- NPSE (**Ref 7.11**) which is the overarching noise policy for England;
- NPS NN (**Ref 7.12**);
- RIS: for the 2015/16 - 2019/20 Road Period (Department of Transport, March 2015) which sets out policies relating to the strategic planning and funding of the road network (**Ref. 7.13**);
- Highways England Licence (**Ref. 7.14**)
- TRL report *Converting the UK traffic noise index $L_{A10, 18h}$ to EU noise indices for noise mapping* (**Ref 7.15**); and
- Highways England Interim Advice Note 185/15 (IAN 185/15) (**Ref 7.16)**

7.7.5. Guidance contained in these documents will be used to determine the potential significant effects upon noise and vibration as a result of the Scheme, with the assessment methodology presented in the section below.

7.7.6. Policy and plans relevant to the Scheme will be presented at Preliminary Design Stage which will form part of the ES and will consist of the following aspects:

- A schedule of the relevant national, regional, county and local policies; and
- A commentary setting out the significance of the impact of the Scheme on each policy objective.

METHODOLOGY

7.7.7. The assessment of noise and vibration will be undertaken in accordance with DMRB HD 213/11 – Revision 1. All road traffic noise predictions will be undertaken in accordance with the calculation methodology presented in the former Department of Transport/Welsh Office technical memorandum Calculation of Road Traffic Noise (CRTN) (**Ref 7.7**). Annual Average Weekday Traffic flows will be used along with data on percentage Heavy Goods Vehicles, speed data and road surface type, to calculate $L_{A10, 18\ hour}$ road traffic noise levels.

7.7.8. Night-time noise level predictions will be undertaken by application of day to night conversion factors using appropriate methodology presented within the TRL report *Converting the UK traffic noise index $L_{A10, 18h}$ to EU noise indices for noise mapping* (**Ref 7.15**)

7.7.9. All traffic speeds will be pivoted and banded according to IAN 185/15 (**Ref 7.16)**

7.7.10. The Options Selection Stage work concluded that there was potential for significant effects. As such, upon receipt of appropriate traffic flow information, it is proposed that a **Detailed Level** assessment will be undertaken in accordance with guidance contained with HD 213/11.

7.7.11. Consideration will be given to both the “short-term” and “long-term” effects, which are defined as those occurring during the year of opening (short-term) and between the year of opening and the worst-case year within 15 years of the year of opening (long-term), which is typically the 15th year. Currently, the year of opening is taken to be 2023, whilst the worst-case year is taken to be 2038.

7.7.12. The assessment includes a requirement to determine the change in road traffic noise level at each dwelling (and other sensitive receptors) within the study area. A computerised 3D road traffic noise model will be used to facilitate the assessment.

Construction Effects

7.7.13. HD 213/11 states when considering the need for assessment of potential noise and vibration effects during the construction phase, the potential for exceeding the criteria provided in BS 5228 (**Ref 7.8**) should be considered.

7.7.14. BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise (**Ref 7.8**), refers to two methods for assessing construction noise based on the level of pre-construction ambient noise at the receptor. Method 1, the ABC method, uses the pre-construction ambient noise level to determine an appropriate threshold value, with a significant effect being indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the pre-determined threshold value. Method 2, the 5 dB(A) change method, indicates a potentially significant effect if the noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values, which are dependent on the time of day. BS 5228 Part 1 also mentions that potentially significant effects could be indicated if a fixed noise level, which depends on the nature of area in which the works are occurring, is exceeded.

7.7.15. As information on the construction activities and associated plant emerges during the EIA, consideration will be given as to which BS 5228 Part 1 assessment method outlined is most appropriate to the specific circumstances of the Scheme and this method will be adopted.

7.7.16. BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration presents guidance on the assessment of construction vibration levels and effects referenced to PPV criteria as reproduced in **Table 5**.

Table 5 Guidance on effects of vibration levels

Vibration Level (PPV) (mm.s-1)	Description of Effect
< 0.3	Unlikely to be perceptible in residential environments.
0.3 to 1.0	Onset of perceptibility in residential areas.
1.0 to 10	Onset of complaints in residential environments.
> 10	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

7.7.17. The construction vibration assessment will follow the guidance from BS 5228 Part 2, as presented above. A significant vibration effect may arise at levels above 1 mm/s PPV, depending on the sensitivity of the receptor to vibration.

Operational Effects

7.7.18. An assessment of potential magnitude of impacts and associated significance of effects will be undertaken with respect to predicted noise level changes in the short-term and long-term, using guidance presented in the DMRB HD 213/11. This states that the determination of appropriate levels of assessment for operational road traffic and noise and vibration effects should be undertaken with reference to the following thresholds:

- A permanent change in daytime road traffic noise of ±1 dB $L_{A10,18h}$ in the short-term (i.e. on opening);
- A permanent change in daytime road traffic noise of ±3 dB $L_{A10,18h}$ in the long-term (typically 15 years after the Scheme opening);
- A permanent change in night-time road traffic noise of ±3 dB $L_{night,\ outside}$ in the long-term, where the predicted level also exceeds 55 dB $L_{night,\ outside}$; and
- A rise in vibration levels to above 0.3 mm/s Peak Particle Velocity (PPV) or any increase above an existing level of 0.3 mm/s PPV.

7.7.19. The DMRB, Volume 11, Section 3, paragraph A1.10 further states that where it is unclear whether the threshold values will be met or exceeded (either because of a lack of suitable information, or a borderline result), then the assessment must proceed to the **Simple Level**. However, where either some or all the threshold values will be exceeded then the assessment must proceed to the **Detailed Level**.

7.7.20. As previously indicated, it is likely that a **Detailed Level** assessment will be undertaken and presented in the ES, however, this will be confirmed following initial analysis of the Scheme traffic data.

7.7.21. In addition to the above requirements of the DMRB, Highways England also requires analysis of Significant Observed Adverse Effect Levels (SOAEL), in accordance with the NPSE. LOAEL and SOAEL will be clearly

defined within the ES and significance of effects will be determined, giving appropriate consideration to relevant guidance.

7.7.22. A noise level above SOAEL will not automatically result in Significant Environmental Effect. For operational noise, the methodology presented within Section 3 of HD 213/11 will be used to define the magnitude of a predicted noise level change. Justification for the determined level of significance will be provided considering a number of contextual factors as detailed within **paragraph 7.6.5.**

7.7.23. Noise changes in NIAs will also require consideration given the strategic policy objective to reduce noise levels in NIAs. It is, however, expected that there will be no NIAs falling within the noise study area.

Human Health

7.7.24. As set out in HD 213/11, a link has been identified between noise impacts and effects on both mental and physiological health. Further research is required to define exposure parameters for a quantitative analysis of such symptoms. Therefore, an assessment will be undertaken to consider noise levels with respect to the NPSE and its first aim, which is to "*avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development*". The measurement of SOAEL considers the health effects of noise. Where noise exceeds the SOAEL due consideration will be given to measures that might be adopted to limit the number of locations so affected and minimise the road traffic noise levels at these locations. This assessment will also consider the noise index for night-time noise, which is recognised by the World Health Organisation as an indicator of impact from night-time noise on health.

7.7.25. The potential effects of the Scheme on human health will be reported within **Chapter 13 - Population and Health** of this Scoping Report.

ASSESSMENT CRITERIA

Construction

7.7.26. In determining significant effects during construction, the methods presented within BS5228: 2019+A1 2014: Part 1 and Part 2 will be considered for construction generated noise and vibration respectively.

Operation

7.7.27. The following criteria will be used for the assessment of operational road traffic noise. These criteria are taken from the DMRB (HD 213/11).

Value (Sensitivity)

7.7.28. The DMRB (HD 213/11) does not explicitly refer to the concept of receptor value (sensitivity), nor does it define a value for the above receptors. Rather, it refers to the magnitude of impact based upon the level of change in the noise environment.

7.7.29. The short-term noise level changes will be determined by comparison of the 'do minimum opening year 2023' and the 'do something opening year 2023' scenarios. The long-term noise level changes will be determined by comparison of the 'do minimum opening year 2023' and the 'do something design year 2038' scenarios.

7.7.30. **Table 6** below summarises the classification of the magnitude of noise impacts associated with short and long-term changes in noise levels, as set out in DMRB HD 213/11. Both adverse and beneficial changes are considered in the assessment.

Table 6 Classification of Magnitude of Noise Impacts (DMRB HD 213/11)

Noise Change dB ($L_{A10,18h}$)		Magnitude of Impact
Short-term	Long-term	
0	0	No change
0.1 – 0.9	0.1 – 2.9	Negligible
1.0 – 2.9	3.0 – 4.9	Minor
3.0 – 4.9	5.0 – 9.9	Moderate
+5.0	+10.0	Major

7.7.31. For the purpose of this assessment, changes in noise levels equating to a minor magnitude of effect and above (both beneficial and adverse) have been considered as potentially significant, in line with the DMRB HD 213/11 guidance. Insignificant effects will not be reported at this stage. Significant beneficial and adverse effects will be reported. Noise and vibration nuisance will also be determined in line with the DMRB HD 213/11.

7.7.32. As required by the DMRB HD 213/11, changes in night-time road traffic noise of ±3 dB $L_{night, outside}$ in the long-term, where the predicted level also exceeds 55 dB $L_{night, outside}$ will likely be considered a significant effect, depending on other contextual factors.

7.7.33. Where the traffic flow falls below 1,000 vehicles in the 18-hour period, the CRTN methodology cannot be applied (as indicated in the guidance, as the methodology would not be accurate below this level). In circumstances where the traffic volume on any particular link falls below the threshold in all scenarios, the link will be excluded from the analysis. However, where the traffic volume falls below the threshold in one scenario, but above in another, that link will be considered further to ensure that potentially significant effects are not overlooked.

7.7.34. For road traffic induced groundborne vibration HD 213/11 advises that an assessment needs only be undertaken 'where required'. It goes on to state that if the level of groundborne vibration (PPV) at a receptor is predicted to rise above 0.3 mms^{-1}, or if an existing level above 0.3 mms^{-1} is predicted to increase, then this should be classed as an adverse effect.

7.7.35. It is noted that groundborne vibration is typically generated where the road surface is poor and / or pitted, the vibration generation mechanism being associated with wheels entering and departing the pit(s). The Scheme would entail newly surfaced roads and it will be the responsibility of Highways England and the relevant Highway Authority in the case of the wider road network, to maintain this surface in a good state of repair. Maintaining the road in a good state is a reasonable expectation to counter this potential impact.

7.7.36. It is therefore proposed that an assessment of road traffic induced groundborne vibration is scoped out of the assessment.

Overall Significance of Effect

7.7.37. For construction noise or vibration, significance of effect will be determined through determination of Observed Effect Level thresholds in combination with the duration and frequency for which such levels are experienced.

7.7.38. For operational noise, the methodology presented within Section 3 of HD 213/11 will be used to define the magnitude of impact. The magnitude of change between the Do-minimum scenario in the baseline year against the Do-something scenario in the baseline year (short term) will be used as a starting point for determining significance of effect. Justification for the determined level of significance will be provided considering a number of contextual factors including, but not limited to, differing magnitude of change predicted in the long term compared to the short term, absolute noise level with reference to LOAEL and SOAEL, circumstances of receptors, acoustic context, likely perception of change by residents, and whether there are any designated sites which are predicted to be affected.

7.8 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

7.8.1. This Scoping Report is based on currently available information. The Scheme and its design is subject to change as the design progresses.

7.8.2. Valid traffic data are currently not available.

7.8.3. It may be necessary that assumptions are adopted regarding existing and future road surface types for both new and existing roads.

7.8.4. The study area cannot be determined until the noise modelling has been undertaken which will define the roads which trigger a significant noise effect.

7.8.5. The noise modelling will incorporate many different data sources such as road traffic data, topography data, baseline mapping data, pavement data, address point data and 3D scheme drawings. The outcome of the modelling is, therefore, reliant on the quality of these data sources. Any limitations of these data sources will be reported in the noise and vibration assessment of the ES, along with any implications.

7.8.6. The BS 5228 calculation methods enable the level of noise during various construction activities to be determined. However, the precision of any such predictions is necessarily limited by the number of assumptions that should be made regarding the number and type of plant to be utilised, their location and detailed operating arrangements. Some of this information will be clarified as the Scheme design progresses and later when a contractor is appointed and resources are mobilised, but other information (such as exactly where the plant operates and for how long) would remain uncertain, even after works have commenced.

8 LANDSCAPE AND VISUAL AMENITY

8.1 INTRODUCTION

8.1.1. This Chapter considers the implications of the Scheme on the landscape and visual amenity during the construction and operational phases and any potential significant effects. It sets out the proposed methodology for the landscape and visual assessment and identifies those impacts that can be scoped out of the EIA.

8.1.2. Landscape and visual assessments are separate although linked processes, describing closely related but distinct sets of effects.

8.1.3. Landscapes are an important component of distinctiveness of any local area; they take their character from a combination of elements, including landform, land use and pattern, land cover / vegetation, open space and cultural heritage influences.

8.1.4. A view, its components and context can have a great effect on the quality of peoples' lives. The landscape and visual assessment will assess potential changes in the existing views, taking into account the extent to which the Scheme would be visible from the surrounding residential properties, footpaths, open spaces, educational buildings and commercial and retail estates

8.1.5. This Chapter has been informed by the results of the A1 Northumberland Option Selection EAR (**Ref 8.1**) and the methodology set out in Interim Advice Note 2010/135 (**Ref 8.2**) and Guidelines for Landscape and Visual Assessment, 3rd Edition, (GLVIA3 (2013)) (**Ref 8.3**).

8.1.6. This Chapter should be read together with the introductory chapters of this Scoping Report (**Chapters 1 - 5**) as well as **Chapter 16 – Assessment of Cumulative Effects**.

8.2 STUDY AREA

8.2.1. The study area for the landscape assessment is defined by the area from which the Scheme may be visible, refer to paragraph 8.2.3, but includes the whole of distinct areas of landscape which are considered to be potentially affected (not just the parts of these areas from which there may be visibility) to take account of potential indirect effects.

8.2.2. The study area for the visual assessment consists of the extent to which the Scheme can be seen, cut off at a distance limit (see below) to ensure a focus on potentially significant effects.

8.2.3. In order to determine the extent to which the Scheme would be visible, a computer-generated Zone of Theoretical Visibility (ZTV) plan will be produced for a high sided vehicle (4.5 m) along the main line centreline, plus the high points of all overbridges along the A1 and the proposed side roads, to understand the extent of visibility of the Scheme including the traffic on it. This will be a ‘bare-ground’ ZTV (taking no account of screening by trees, woodlands, buildings or structures) based on a viewer eye height of 1.5 m and using the Ordnance Survey Terrain 5 digital terrain model.

8.2.4. Experience from similar developments suggests that significant adverse landscape and visual effects are not likely beyond 1 km for a Scheme of this scale, except where traffic noise affects the perception of a tranquil landscape. In adopting a precautionary approach to potentially significant effects, the study area will be 2 km from the centreline of the Scheme for visual receptors, this will be reviewed (reduced to 1 km – minimum / extended to 5 km - maximum) following, the site visit and assessment work, where the Visual Envelope (VE) will be reviewed in the field to consider screening elements noted in para 8.2.3 above.

8.2.5. The study area for landscape effects will be determined by the extent to which the whole of distinct areas of landscape may be potentially affected within an initial 2 km study area. Likewise, for visual effects the study area will be initially set at 2 km. These will be agreed with Northumberland County Council (NCC) prior to the publication of the Preliminary Environmental Information Report (PEIR).

8.3 BASELINE CONDITIONS

8.3.1. The following data sources have been consulted to inform the baseline review for this scoping report:

- Northumberland Consolidated Planning Policy Framework (**Ref 8.4**) and saved policy documents from the previous authorities;
  - Alnwick Landscape Character Assessment Supplementary Planning Document (SPD) (**Ref 8.5**);
  - Alnwick District Wide Local Plan; (**Ref 8.15**);
  - Alnwick District Local Development Framework (LDF) Core Strategy; (**Ref 8.6**); and
  - Berwick-Upon-Tweed Local Plan (**Ref 8.7**).
- National Character Areas, Natural England (**Ref 8.8**):
  - NCA 1 – Northumberland Coastal Plain (**Ref 8.9**); and
  - NCA 2 – Northumberland Sandstone Hills (**Ref 8.10**).
- Northumberland Landscape Character Assessment; Part A Landscape Classification (**Ref 8.11**);
- Magic Website (**Ref 8.12**);
- Google Earth (**Ref 8.13**); and
- Bing Maps (**Ref 8.14**) (including online copies of Ordnance Survey mapping from Bing and Northumberland's Public Right of Way Mapping, available at *http://map.northumberland.gov.uk/prow/*).

LANDSCAPE BASELINE

STATUTORY LANDSCAPE DESIGNATIONS

8.3.2. Northumberland Coast AONB lies approximately 5 km to the east of the Main Scheme Area. The AONB covers the east coastal area of Northumberland.

8.3.3. There are two registered park and gardens within the study area, which are Alnwick Castle, approximately 1 km to the south-west and Howick Hall approximately 5 km to the east of the Main Scheme Area. The locations of the Statutory Landscape Designations are illustrated on **Appendix A - Figure A6 Visual Envelope.**

RELEVANT NON - STATUTORY DESIGNATIONS

8.3.4. There are numerous ancient woodlands within the study area, of note is Swineclose, approximately 1 km to the north of the Main Scheme Area.

8.3.5. It is noted that Kyloe Hills and Glendale Area of High Landscape Value (AHLV), as designated in the Berwick-upon-Tweed Borough Local Plan (**Ref 8.7**) – saved policies 2007, and an Intermediate Area of Landscape Value is located approximately 1 km north of the Main Scheme Area.

8.3.6. It is noted that an AHLV, as designated in the Alnwick District Wide Local Plan (Policy RE17) (**Ref 8.15**) to the west of the Main Scheme Area, was replaced by Policy S13 in the Alnwick LDF (**Ref 8.6**), which now refers to the Alnwick LCA Supplementary Planning Document (SPD) (**Ref 8.5**), this notes that the scenic quality of a high proportion of the district has been recognised in the past by local landscape designations. The location of these designations is shown on **Figure A2 – Environmental Constraints Plan.**

8.3.7. Following the release of the NPPF in 2012 (updated in 2018) and the development of local plans, local authorities in England have been discouraged from designating regional landscapes. Hence the existence of AHLVs in Alnwick District Wide Local Plan and their absence in later policy documents.

8.3.8. Landscape value relates to areas of particular scenic quality or those displaying important historic and cultural associations. Landscape value is frequently addressed by reference to international, national, regional and local designations. An absence of a formal designation does not, however, determine that a landscape is necessarily of low value; factors such as accessibility and local scarcity can render areas of unremarkable quality highly valuable as a local resource.

LANDSCAPE CONTEXT

Main Scheme Area, Main Compound and Lionheart Enterprise Park Compound

8.3.9. The study area lies 5 km west of the Northumberland Coast. The A1 (Main Scheme Area) is a large linear feature which dissects the gently rolling landscape. To the east the landform gradually rises to approximately 100 m Above Ordnance Datum (AOD) near Rennington Moor. To the west, the land is slightly hillier with more undulations and a high point of approximately 140 m AOD near White House Folly.

8.3.10. The River Aln meanders through the south of the study area. The A1 (Main Scheme Area) is a noticeable straight feature which cuts across the irregular grain of the landscape, minor roads weave through the landscape following irregular hedgerow field boundaries. Settlement is of small contained villages and farmsteads are sparsely scattered throughout the study area, with exception of Alnwick, a large settlement to the south west. A number of PRoWs are present within the study area which connect farmsteads and small settlements.

8.3.11. Wind turbines are a noticeable feature of this landscape to the west. Field boundaries are defined by low hedgerows, which enable long expansive views across the majority of the landscape. In localised areas, (near Alnwick and along sections of close proximity PRoWs) views are filtered by the undulating landform and woodland tree planting.

8.3.12. The site of the Lionheart Enterprise Park Compound is located to the south of the study area near Alnwick (south of the A1) in close proximity to Cawledge Burn and the associated woodland, where ground levels fall to a low point of 35 m AOD. The site itself is bordered by an existing hedgerow to the south, existing industrial estate to the north and an existing PRoW to the west.

8.3.13. The second site compound (Main Compound, located at Westmoor Junction, off Felton Road) is located further south off the B6345 and north of Eshott Airfield. The landscape in this area is relatively flat with little woodland tree cover except for along the River Coquet north of the compound. This site is bordered by existing tree and hedgerow planting on all boundaries.

LANDSCAPE CHARACTER

National Character Areas

8.3.14. The Scheme lies partly within National Character Area (NCA) 2 (**Ref 8.10**): Northumberland Sandstone Hills and partly within NCA1 (**Ref 8.9**): Northumberland Sandstone hills.

8.3.15. The key characteristics of NCA2 (**Ref 8.10**) NCA 1 (Ref 8.9) as set out in the Natural England National Character Area Profiles (**Ref 8.8**) are detailed within **Appendix D - Detailed Landscape Character Information**.

Regional Landscape Character Areas

8.3.16. The Northumberland Landscape Character Assessment (**Ref 8.11**) identifies Regional Landscape Character Areas (Regional LCAs) and Landscape Character Types (LCTs) relevant to the Scheme.

8.3.17. Regional LCAs that are located within the red line boundary and the 2 km study area, are listed below. These are also shown on **Figure A5 – Landscape Character Areas**.

- 3c Rock LCA (Farmland Coastal Plain LCT);
- 8c Charlton Ridge LCA (Outcrop Hills and Escarpments LCT);
- 38a Longframlington LCA (Lowland Rolling Farmland LCT); and
- 2a Lower Aln LCA (Coastal Incised Valley LCT).

8.3.18. The following Regional Landscape Character Areas are also present within the 2-5 km, wider study area:

- 10a Rosebrough Moor LCA (Smooth Moorland LCT); and
- 7a Hulne Park LCA (Estate Valley LCT).

8.3.19. The key characteristics of these Regional LCTs and LCAs are detailed within Appendix C - Detailed Landscape Character Information.

Local Landscape Character Areas

8.3.20. Based on previous experience of Schemes of a similar scale, this assessment will assess the effect on the Regional LCAs only, as they are considered to be at an appropriate scale for an assessment of a highway Scheme of this nature and scale. However, the information contained within the Alnwick Local Landscape Character Assessment will be used to inform the assessment and mitigation proposals to ensure the Scheme responds at a local scale as set out in the Alnwick LCA SPD (**Ref 8.5**) and as detailed within **Appendix D - Detailed Landscape Character Information**.

8.3.21. The Options Selection Stage EAR identified the sensitivity of three Regional LCTs. These findings will be presented as part of the ES.

Visual Baseline

8.3.22. This gently rolling landscape affords open views from higher ground but limited views from lower ground, particularly where belts of woodland filter the view.

8.3.23. The land rises to the west of the A1 offering long distance views to the east. Views of the A1 are limited due to its position lower in the landscape and belts of woodland, which screen and filter views.

8.3.24. From the visual envelope in the Options Selection Stage EAR (**Ref 8.1**), the greatest visibility is to the west near South Charlton and to the east adjacent to Denwick, which is reflected in the bare ground ZTV (see **Appendix A - Figure A6 Visual Envelope**). As part of the assessment process the findings of the bare ground ZTV and visual envelope will be reviewed in the field.

Visual Receptors

8.3.25. For the purposes of assessment, whilst it is the people who live, work and take part in recreational activities in the area, along with those simply passing through, who view and enjoy the landscape, it is the places they may occupy that are mapped and described as the 'visual receptors'.

8.3.26. The potential visual receptors of the Scheme have been identified, and can be categorised as follows:

- residential receptors;
- recreational receptors (including users of cycle routes and PRoWs;
- transport receptors; and
- places of work, (education, commercial, tourism) receptors.

8.3.27. Residential receptors – people enjoying the view from their home – are usually considered to be highly susceptible to visual change, and thus high sensitivity receptors.

8.3.28. Residential receptors likely to be affected by the Scheme as stated in the Options Selection Stage EAR (**Ref 8.1**) include:

- Broom House;
- Loaning Head;
- Heckley House;
- Heckley Cottage;
- Heckley Fence;
- Heiferlaw Bank;
- Rock Lodge;
- Rock Nab and surrounding properties;
- Holywell Cottage;
- Silvermoor;
- Broxfield and surrounding properties;
- West Linkhall Farmhouse and surrounding properties;
- Rock Midstead Cottages;
- Rock Midstead Farmhouse;
- Drythropple;
- Rock Moor House;
- West Lodge;
- The Whinny;
- South Charlton Farm;
- Brockley Hall Cottages;
- Brockley Hall;
- Properties on the west side of South Charlton;
- Patterson Cottage;
- Charlton Mires;
- Properties at East Linkhall; and
- Properties at North Charlton.

8.3.29. Recreational receptors may be of low, medium or high sensitivity depending on the context. People enjoying outdoor recreation where the view is important to the experience are normally considered to be of high sensitivity, such as recreational users of the PRoW Network within the study area. Recreational receptors likely to be affected by the Scheme as stated in the Options Selection Stage EAR (**Ref 8.1**) include:

- PRoW Ref: 112/008;
- PRoW Ref: 129/004;
- PRoW Ref: 129/005;
- PRoW Ref: 129/009;
- PRoW Ref: 110/019;
- PRoW Ref: 110/003;
- PRoW Ref: 129/022
- PRoW Ref: 110/013;
- PRoW Ref: 110/004; and
- PRoW Ref: 129/014.

8.3.30. For recreational users taking part in activities where the view is less important to the experience because the focus is more on the activity itself (Eshott Airfield) they are normally considered of medium sensitivity.

8.3.31. People visiting and working in schools and other institutional buildings including their outdoor areas are normally considered to be of medium sensitivity.

8.3.32. Transport receptors (users of local roads); are usually considered to be of medium sensitivity except where the road is part of a formally or informally recognised tourist route. Transport receptors likely to be affected by the Scheme include:

- A1;
- B6347; and
- B6341.

8.3.33. Commercial receptors; people at work or similar are usually considered to be of low sensitivity, unless it is clear that they are designed to take advantage of a view (e.g. a hotel with panoramic windows). Commercial receptors likely to be affected by the Scheme as stated in the Options Selection Stage EAR (**Ref 8.1**) include:

- The Old Stable;
- The Art Rock Café and Gallery; and
- Rock Moor House Bed and Breakfast.

8.3.34. The visual sensitivity of each receptor will be determined during the assessment.

8.4 POTENTIAL IMPACTS

8.4.1. The Options Selection Stage assessment identified that the Scheme has the potential to generate the impacts set out in the paragraphs below. Further consideration will be given during the **Detailed Level** assessment within the ES.

CONSTRUCTION

8.4.2. During construction there is the potential for adverse impacts on landscape character and visual amenity. This would be due to construction activities such as vegetation removal, soil stripping, material storage mounds, plant movements, temporary lighting and machine activity to build structures, earthworks and the road surfaces. Temporary construction compounds are also required (two offsite locations have been identified).

8.4.3. The Scheme may result in the following construction impacts:

LANDSCAPE

- Direct loss of landscape features such as hedges, trees and agricultural land adjacent to the existing route of the A1;
- Alteration to topography due to the proposed raised junction embankment (Charlton Mires Junction Bridge) and construction of the proposed Broxfield Overbridge;
- Temporary alteration to field boundaries including vegetation loss;
- Temporary alteration to natural or cultural heritage features of interest;
- Reduction of tranquillity within those areas associated with the construction works; and
- Temporary localised landscape impacts from the presence of construction compounds and temporary spoil heaps.

VISUAL

- Temporary presence of construction compounds (two have been identified), reducing visual amenity and restricting views of open skyline at close proximity;
- Temporary traffic management, movement and activity of construction plant likely to be visible above intervening vegetation and site hoarding;
- Temporary spoil heaps and introduction of embankments which are bare earth prior to plant establishment, reducing visual amenity;
- Alteration to topography due to the raised junction embankment and improvement works at Broxfield Overbridge, restricting visibility for close proximity receptors;
- Temporary lighting of works areas in areas previously unlit; and
  Alteration to vegetation including tree cover which would open up views.

OPERATION

8.4.4. The widening of the road to the east, junction improvements and bridge works has the potential to generate operational effects for landscape and visual receptors as detailed below:

LANDSCAPE

- The widening of the existing A1 carriageway to the east, increasing its prominence within the landscape;
- Alteration to existing landform (cuttings and embankments), a raised junction (Charlton Mires Junction Bridge) and the proposed Broxfield Overbridge;
- Alteration to field boundaries; and
  Reduction of tranquillity within those areas associated with the Scheme through the introduction of movement and noise.

VISUAL

- Increase in light pollution from vehicles at night due around newly proposed junctions (Charlton Mires Junction Bridge); and
- Increased visual presence of the road and raised junction and bridge areas.

8.4.5. The findings of the Options Selection Stage EAR will be reviewed as part of the **Detailed Assessment**.

8.5 DESIGN, MITIGATION AND ENHANCEMENT MEASURES

8.5.1. Indicative high-level mitigation proposals are described below. These incorporate a range of measures to integrate the Scheme into the surrounding landscape, thereby limiting effects on landscape character and visual receptors. These will be further explored during the detailed assessment process as part of the EIA and through an iterative design process.

8.5.2. At this stage the mitigation measures detailed below are indicative only and highlight the principles and objectives to be followed during detailed design of the Scheme.

CONSTRUCTION

- Minimise loss of existing vegetation and retain where possible; and
- As far as possible ensure that construction compounds are located in areas away from visually sensitive receptors.

OPERATION

- Reinstatement of existing woodland blocks, hedgerows and individual trees lost during the construction phase;
- Woodland and shrub planting, with a choice of species reflecting local character, where possible integrate planting into existing woodland areas to improve connectivity of resources and screening;
- Introduce species-rich grassland to increase local biodiversity;
- Design of structures, walls and fences to reflect local landscape character and pattern. Where screening vegetation is not practical / appropriate false cuttings may be used;
- Improve connectivity of existing habitats, through planting of linear belts of shrubs and trees where possible; and
- Retain views to local landmarks to retain a sense of place for drivers, where this not in conflict with visual mitigation measures.

8.6 DESCRIPTION OF THE LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION

8.6.1. The Options Selection Stage assessment highlighted that the Scheme is not anticipated to have any significant effects on landscape receptors during construction. The Options Section Stage considered effects on the larger scale Regional LCTs, the Detailed Assessment will consider effects on the more specific Regional LCAs, which are deemed more appropriate for the scale of the Scheme. The detailed assessment of the Scheme has the potential to create significant landscape effects for the following Regional LCAs:

- 3c Rock LCA (Farmland Coastal Plain LCT);
- 8c Charlton Ridge LCA (Outcrop Hills and Escarpments LCT);
- 38a Longframlington LCA (Lowland Rolling Farmland LCT); and
- 2a Lower Aln LCA (Coastal Incised Valley LCT).

8.6.2. The above Regional LCAs are likely to have significant effects due to vegetation loss and changes to topography.

8.6.3. The Scheme is likely to have adverse visual impacts during construction on:

- Residential receptors within close proximity to the Scheme;
- Recreational receptors within close proximity to the Scheme; and
- Receptors in close proximity to construction compounds and temporary spoil heaps.

OPERATION

8.6.4. The Options Selection Stage assessment highlighted that the Scheme is not anticipated to have any significant effects on landscape receptors. The Options Section Stage considered effects on the larger scale Regional LCTs, the Detailed Assessment will consider effects on the more specific Regional LCAs, which are deemed more appropriate for the scale of the Scheme. The detailed assessment of the Scheme has the potential to create significant landscape effects for the following Regional LCAs:

- 3c Rock LCA (Farmland Coastal Plain LCT);
- 8c Charlton Ridge LCA (Outcrop Hills and Escarpments LCT);
- 38a Longframlington LCA (Lowland Rolling Farmland LCT); and
- 2a Lower Aln LCA (Coastal Incised Valley LCT).

8.6.5. The Scheme is likely to have adverse landscape impacts on completion and in operation, due to changes in topography and whilst vegetation establishes.

8.6.6. The Scheme is likely to have adverse visual impacts on completion and in operation on:

- Recreational receptors within close proximity to the Scheme;
- Residential receptors within close proximity to the Scheme;
- Residential receptors around the proposed raised junction;
- Residential and recreational receptors in close proximity to the works at Broxfield overbridge; and
- Residential receptors to the east of the Scheme on higher ground where the Scheme will be more noticeable in views.

8.7 ASSESSMENT METHODOLOGY

TOPICS AND ELEMENTS OF TOPICS TO BE SCOPED IN AND OUT

8.7.1. A **Simple Level** landscape assessment was undertaken for the Options Selection Stage EAR (**Ref 8.1**). No elements of the Landscape and Visual Impact Assessment (LVIA) are proposed to be scoped out.

8.7.2. In accordance with IAN 135/10 (**Ref 8.2**), a **Detailed Level** landscape and visual amenity assessment is considered appropriate to be undertaken for this NSIP, which will be undertaken through the EIA. A detailed assessment is considered appropriate given that the proposed works include widening and improving the trunk road along its current alignment within open countryside. Previous studies (undertaken by others) has identified the potential for significant effects to arise, therefore a **Detailed Level** assessment would provide

further refinement of the assessment to better understand and appreciate the magnitude of impact and potential for significant effects.

LEGISLATION, POLICY AND GUIDANCE

8.7.3. Policy relevant to the Scheme will be presented in the ES and will consist of the following:

- Northumberland Consolidated Planning Policy Framework (**Ref 8.4**) and saved policy documents from the previous authorities;
- Alnwick Landscape Character Assessment Supplementary Planning Document (SPD) (**Ref 8.5**);
- Alnwick District Local Development Framework Core Strategy (**Ref 8.6**); and
- Berwick-upon-Tweed Borough Local Plan (**Ref 8.7**).

8.7.4. Policy and plans relevant to the Scheme will be presented at Preliminary Design Stage which will form part of the ES. These will consist of the following aspects:

- A schedule of the relevant national, regional, county and local policies; and
- A commentary setting out the significance of the impact of the Scheme on each policy objective.

METHODOLOGY

8.7.5. The methodology will be primarily informed by the guidance provided in IAN 135/10 (**Ref 8.2**) supported and updated as appropriate by GLVIA3 (**Ref 8.3**), where the latter places greater emphasis on the explanation and justification for assessment criterion and conclusions, appropriate to the Scheme being assessed.

8.7.6. The LVIA will build on the baseline information acquired for the Option Selection Stage EAR (**Ref 8.1**) and this scoping report to assess the potential landscape and visual impacts of the Scheme on individual receptors through the following:

- ZTV to define the extent of the study areas as set out within Para 8.2.3;
- Desk study and fieldwork to identify the character of the landscape, including its condition, value and sensitivity to change;
- Desk study and fieldwork to identify the visual receptors, including noting their nature, context and sensitivity;
- Review and update the baseline information including relevant planning policies, regional and district landscape character guidance;
- Review the Landscape Character Areas and determine if there has been any substantial landscape change since they were defined, that may require revision of boundaries or descriptions, and consider the landscape of the road corridor to determine if any assessment at a finer grain is required;
- Appraise the sensitivity of landscape to the change anticipated to arise from the introduction of the Scheme, then assess the magnitude of impact to determine the significance of landscape effects;
- Assess the magnitude of visual impacts and determination of the significance of visual effects;
- Develop a landscape strategy to avoid, reduce or mitigate adverse effects, enhance the road landscape and integrate ecological mitigation.

Landscape Assessment

8.7.7. Effects on landscape character will be assessed by considering the components that define character and their sensitivity to the type, scale and duration of the proposed change, taking into account any mitigation measures.

8.7.8. The assessment will be undertaken for both day and night-time situations and compared against the situation that would exist if the Scheme were not to proceed (i.e. the 'Do Minimum'), using the following scenarios:

- During construction, assuming a maximum perceived change in situation;
- In the winter of the year of opening (to represent a maximum effect situation, before any planted mitigation can take effect), taking account of the completed Scheme and the traffic using it, and:
- In the summer of the fifteenth year after the Scheme opening, (to represent a least effect scenario, where any planted mitigation measures can be expected to be reasonably effective), taking account of the completed Scheme and the traffic using it.

Landscape Sensitivity

8.7.9. Landscape sensitivity is derived from the combination of a landscape's susceptibility to change, value and quality. The determination of the sensitivity of the landscape resource is based upon an evaluation of each key element or characteristic of the landscape likely to be affected.

8.7.10. Landscape quality relates to the intrinsic aesthetic appeal demonstrated by a character zone or feature / composition within the landscape, including the relative condition of the landscape and features.

8.7.11. **Table 7** below describes the criteria used in the judgement of landscape quality. This table is based on IAN 135/10, developed and expanded upon in accordance with GLVIA3. It is considered that the below criteria are more appropriate to the scale and nature of the Scheme as GLVIA3 places greater emphasis on the explanation and justification for assessment criterion and conclusions of professional judgement.

Table 7 Landscape quality criteria

Rating	Criteria
Outstanding	Areas comprising a clear composition of valued landscape components in robust form and health, free of disruptive visual detractors and with a strong sense of place. Areas containing a strong, balanced structure with distinct features worthy of conservation.
Very attractive	Areas primarily of valued landscape components combined in an aesthetically pleasing composition and lacking prominent disruptive visual detractors. Areas containing a strong structure with noteworthy features or elements, exhibiting a sense of place.
Good	Areas primarily of valued landscape components combined in an aesthetically pleasing composition with low levels of disruptive visual detractors, exhibiting a recognisable landscape structure.
Ordinary	Areas containing some features of landscape value but lacking a coherent and aesthetically pleasing composition with frequent detracting visual elements, exhibiting a distinguishable structure often concealed by mixed land uses or development. Such areas would be commonplace at the local level and would generally be undesignated, offering scope for improvement.
Poor	Areas lacking valued landscape components or comprising degraded, disturbed or derelict features, lacking any aesthetically pleasing composition with a dominance of visually detracting elements, exhibiting mixed land uses which conceal the baseline structure. Such areas would generally be restricted to the local level and identified as requiring recovery.

Source: IAN135/10 & GLVIA 3

8.7.12. Landscape value relates to areas of particular scenic quality or those displaying important historic and cultural associations. Landscape value is frequently addressed by reference to international, national, regional and local designations. An absence of a formal designation does not, however, determine that a landscape is necessarily of low value; factors such as accessibility and local scarcity can render areas of unremarkable quality highly valuable as a local resource.

8.7.13. Landscape value and quality contribute to the consideration of landscape sensitivity. **Table 8** details the criteria that will be used when describing landscape sensitivity. This table is based on IAN 135/10, developed and expanded upon in accordance with GLVIA3. It is considered that the below criteria are more appropriate to the scale and nature of the Scheme as GLVIA3 places greater emphasis on the explanation and justification for assessment criterion and conclusions of professional judgement.

Table 8 Landscape sensitivity criteria

Rating	Criteria
High	Landscapes which by nature of their character would be unable to accommodate change of the type proposed. Typically, these would be:

Rating	Criteria
	▪ Of high quality with distinctive elements and features making a positive contribution to character and sense of place. ▪ Likely to be designated, but the aspects which underpin such value may also be present outside designated areas, especially at the local scale. ▪ Areas of special recognised value through use, perception or historic and cultural associations. ▪ Likely to contain features and elements that are rare and could not be replaced.
Moderate	Landscapes which by nature of their character would be able to partly accommodate change of the type proposed. Typically, these would be; ▪ Comprised of commonplace elements and features creating generally unremarkable character but with some sense of place. ▪ Locally designated, or their value may be expressed through non-statutory local publications. ▪ Containing some features of value through use, perception or historic and cultural associations. ▪ Likely to contain some features and elements that could not be replaced.
Low	Landscapes which by nature of their character would be able to accommodate change of the type proposed. Typically, these would be; ▪ Comprised of some features and elements that are discordant, derelict or in decline, resulting in indistinct character with little or no sense of place. ▪ Not designated. ▪ Containing few, if any, features of value through use, perception or historic and cultural associations. ▪ Likely to contain few, if any, features and elements that could not be replaced.

Source: IAN135/10 & GLVIA 3

Landscape magnitude of Impact

8.7.14. The magnitude of impact is the degree of change that would arise if the Scheme was completed. The magnitude of impact depends upon a combination of factors, such as the size or scale of the change (loss of landscape features – woodland, hedgerows, boundaries and landform), the geographical extent of the area influenced and its duration and reversibility. Magnitude of impact can be either Adverse or Beneficial. Definitions associated with the magnitude of impact are listed below within **Table 9.** The criteria are based on IAN 135/10 but presented in a format that is consistent with this Report.

Table 9 Landscape magnitude of Impact

Rating	Criteria
Major	Total loss or large scale damage to existing character or distinctive features and elements, and/or the addition of new but uncharacteristic conspicuous features and elements, or Large scale improvement of character by the restoration of features and elements, and/or the removal of uncharacteristic and conspicuous features and elements, or by the addition of new distinctive features.
Moderate	Partial loss or noticeable damage to existing character or distinctive features and elements, and/or the addition of new but uncharacteristic noticeable features and elements, or

Rating	Criteria
	Partial or noticeable improvement of character by the restoration of existing features and elements, and/or the removal of uncharacteristic and noticeable features and elements, or by the addition of new characteristic features.
Minor	Slight loss or damage to existing character or feature and elements, and/or the addition of new but uncharacteristic features and elements, or Slight improvement of character by the restoration of existing features and elements, and/or the removal of uncharacteristic features and elements, or by the addition of new characteristic elements.
Negligible	Where the development would appear as a barely perceptible component in the landscape and result in very minor alteration to the existing balance of components in the baseline context.
No Change	Where the development would have no effect on the components in the landscape resulting in no alteration to the existing balance of components in the baseline context. No noticeable loss, damage or alteration to character or features or elements.

Source: Adapted from IAN135/10

Visual Assessment

8.7.15. When considering the impacts of the Scheme (magnitude of change) upon the respective visual receptors the following scenarios will be assessed:

- Construction Phase – During the construction period, assuming a maximum perceived change situation (i.e. when construction activity is at its peak for any given view), and noting how long that period is likely to last;
- Winter (year 1) – A winter's day in the year that the Scheme would open to traffic or be fully operational (i.e. with noise / visual screens and mounds in place but before any planted mitigation has begun to take effect);
- Summer (year 15) – A summer's day in the fifteenth year after opening (i.e. when the planted mitigation measures can be assumed to be substantially effective). This is usually a reflection of the near fully mitigated scenario under normal conditions; and
- Night-time assessment (if it is determined that the final Scheme design has the potential for significant adverse effects at night; this assessment would follow general principles of GLVIA3).

Visual Sensitivity

8.7.16. As noted in GLVIA3, visual sensitivity is a function of the susceptibility of the different visual receptors to changes in the view and the value attached to particular views.

8.7.17. **Table 10** below sets out criteria for the judgement of visual sensitivity that will be used in the EIA. This table is based on Table 1 of IAN 135/10, developed and expanded upon in accordance with GLVIA3. It is considered that the criteria in the table below, are more appropriate to the scale and nature of the Scheme.

Table 10 Visual Sensitivity

Rating	Criteria
High	▪ Residents at home (views from principal aspects) and communities or settlements where views are an important contribution to the landscape setting; ▪ People enjoying outdoor recreation where the view is important to the experience e.g., users of long-distance trails and scenic public rights of way and cycle; routes, walkers on National Trust or other access land, visitors to Country Parks

Rating	Criteria
	▪ Visitors to recognised attractions where views of the surroundings are an important contributor to the experience; ▪ Users of scenic roads, railways or waterways identified as designated tourist routes.
Moderate	▪ People enjoying outdoor recreation where the view is secondary to the activity e.g. people playing outdoor sports, users of public rights of way where the main activity is exercise or getting from A to B; ▪ Schools and other institutional buildings, and their outdoor areas. ▪ Users of local roads and rail passengers, where views form an intrinsic part of the experience; ▪ People at work and commercial premises where the view is an important contribution to the quality of the workplace e.g. certain business parks, hotels and restaurants designed to take advantage of a scenic setting.
Low	▪ People at work and commercial premises except where noted above, where work activities; ▪ Users of recreational facilities where the purpose of that recreation is not related to the view e.g. indoor sports facilities, football pitches and stadia; ▪ Users of trunk roads and main railway routes where highly transient views are afforded.

Source: IAN135/10 & GLVIA 3

Visual magnitude of Impact

8.7.18. Magnitude of impact considers the scale and nature of change within the view, taking into consideration the duration of change, the distance of the receptor from the development, the direction of view, the receptors speed of movement, screening (both proposed or removal of existing vegetation) and embedded mitigation measures. During the assessment, consideration will be given to the proposed mitigation measures intended to further avoid, reduce or where possible reverse those impacts caused by the Scheme. Table 2 of IAN 135/10 describes the scale of magnitude proposed for carrying out the visual effects section of the assessment.

Viewpoints and photography

8.7.19. Photography will be undertaken as part of the fieldwork to illustrate the LVIA. Photomontages may be required where there are particular elements to be illustrated or particularly sensitive views to be assessed. The requirement for, and number of, photomontages is not known at the time and will be agreed with the statutory consultees should they be required. Statutory consultees include Historic England, NCC, Landscape and Planning Officer, AONB Officer, Natural England, and Northumberland National Park Authority.

8.7.20. Viewpoints are selected to represent the nature and type of visual amenity from a given area or direction of view. They are not offered as the 'only view' but is used to inform a greater understanding of the extent of visibility and the nature of change.

8.7.21. Likely viewpoints to illustrate the Scheme are presented in **Table 11** and the visual envelope in **Appendix A - Figure A6 Visual Envelope**.

Table 11 Potential Viewpoints

Representative Viewpoint	Receptors
1. North Charlton	Residential receptors on the southern edge of North Charlton
2. West Linkhall	Residential receptors at West Linkhall and PRoW
3. South Charlton	Residential receptors at South Charlton and South Charlton Farm and permissive path
4.Rock Lodge	Residential receptors at Rock Lodge and Rock Nab, PRoW
5. Heiferlaw Bank	Residential receptors at Heiferlaw Bank and PRoW
6. Heckley Fence	Residential receptors at Heckley Fence and PRoW
7. Heckley House	Residential receptors at Heckley House and PRoW
8. Broom House	Residential receptors at Broom House and Broom House Farm and PRoW
9. Broxfield	Residential receptors at Broxfield and Silvermoor and PRoW
10. Rock South Farm	Residential receptors at Rock South Farm and PRoW
11. Rock Midstead	Residential receptors at Rock Midstead, Rock Midstead Farm and PRoW
12. Charlton Mires	Residential receptors at Charlton Mires
13. Drythropple	Residential receptors at Drythropple and Rock Moor House
14. Chipperton Bridge	Residential receptors at Chipperton Bridge and East Linkhall
15. PRoW Ref: 141/013	Recreational receptors travelling along PRoW Ref 141/013
16. Lionheart Enterprise Park	Transport receptors travelling along unnamed road and Commercial receptors at Lionheart Enterprise Park
17. West Farm	Residential receptors at West Farm and PRoW
18. B1340	Transport receptors travelling along B1340
19. PRoW 129/006	Users of PRoW

8.7.22. This list is not definitive and viewpoints may be added or removed following site work and during the assessment.

8.7.23. As noted above, the number and location of viewpoints and the number and location of any photomontages will be agreed with NCC and Historic England.

8.7.24. It should be noted that the assessment will describe and assess the landscape and visual effects in a holistic manner – rather than relying on the assessment of representative viewpoints.

Significance Criteria

8.7.25. The significance criteria given in IAN 135/10 (**Ref 8.2**) Landscape and Visual Effects Assessment will be used for the determination of the overall significance of landscape and visual impacts.

8.7.26. In all cases, professional judgment will be used to determine the sensitivity of affected receptors, the magnitude of impact and how these are combined to determine potentially significant effects. Following the criteria set out within this chapter which has been developed from guidance including IAN 135/10 and GLVIA3.

8.8 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

8.8.1. This scoping report is based on the information available at time of writing.

8.8.2. The landscape and visual effects of introducing a new development of this scale and nature are normally considered to be of an adverse nature.

8.8.3. The magnitude of landscape effects is dependent on the scale at which the landscape is considered. The Scheme is likely to completely transform the landscape of a single field that it traverses whilst it may have a minor or moderate effect on a single defined unit of a single landscape character type and no effect on the landscape of the County as a whole. In this assessment the landscape will be assessed at the scale of Regional Landscape Character Types or Areas. Locally more severe effects on pockets of particular landscape value may be identified if appropriate.

9 CULTURAL HERITAGE

9.1 INTRODUCTION

9.1.1. This Chapter considers the implications of the Scheme on cultural heritage during the construction and operational phases and assesses any potential significant effects. It sets out the proposed methodology for the cultural heritage assessment and identifies those impacts that can be scoped out of the EIA.

9.1.2. This Chapter considers the main area of the Scheme, the Main Compound and the compound at Lionheart Enterprise Park, Alnwick.

9.1.3. This Chapter has been informed by the results of the Options Selection Stage EAR (**Ref 9.1**) and the methodology set out in DMRB Volume 11, Section 3, Part 2 'Cultural Heritage' (HA208/07) (**Ref 9.2**).

9.1.4. This Chapter should be read together with the introductory chapters of this Report (**Chapters 1 - 5**) as well as **Chapter 16 – Assessment of Cumulative Effects**.

9.2 STUDY AREA

9.2.1. Two study areas will be applied for the assessment within the EIA. A study area of 500 m from the Scheme Footprint will be applied to non-designated assets, and a wider study area of 1 km for statutory designated assets, conservation areas and historic landscapes. The study areas are based on accepted best practice and due to the scale and nature of the development as well as similar schemes in the same region.

9.2.2. NCC and Historic England will be consulted in order to identify any additional heritage assets beyond the proposed study areas which require scoping in for assessment within the EIA.

9.3 BASELINE CONDITIONS

9.3.1. The following data sources have been consulted to inform the baseline review:

- The National Heritage List England (NHLE);
- The Northumberland Historic Environment Record (HER);
- The Northumberland Historic Landscape Characterisation (HLC); and
- The Options Selection Stage EAR.

9.3.2. In the wider study areas there are nine Scheduled Monuments, 55 Listed Buildings (one Grade I, two Grade II* and 52 Grade II), one Grade I Registered Park and Garden, see **Appendix A - Figure A3: Designated Heritage Assets**. There are 28 non-designated heritage assets recorded in the Northumberland HER in the inner study area see **Appendix A - Figure A4: Non-Designated Heritage Assets**.

BELOW GROUND ARCHAEOLOGICAL REMAINS AND EARTHWORKS

Main Scheme area

9.3.3. One Scheduled Monument is located within the Scheme Footprint, towards the north end of the Scheme (Prehistoric burial mound, 420 m north-west of East Linkhall (NHLE 1018499)). The monument is described as a "bowl barrow", a form which dates from the Late Neolithic to the Late Bronze Age and can occur either in isolation or as a part of a group or cemetery. An excavation at the site in the late 19th century found a cist buried within the mound which contained an inhumation and a glass bead. It is believed that further burials remain intact within the monument.

9.3.4. Approximately 220 m to the north of the Scheduled Monument, also within the Scheme Footprint, is the site of two cist burials of probable Bronze Age date (HER 5033) found in the early 19th century with a brass spear. The cists likely mark the location of a former barrow, although no trace is now visible on the ground surface. A further barrow is recorded in this proximity, approximately 350 m to the east near East Linkhall (HER 5035). Barrows are also recorded a short distance to the west of the Scheme boundary in Ellsnook Plantation (NHLE 1006564) and near Charlton Mires (HER 5045). A cropmark ring ditch (HER 4451), located approximately 1.2 km south of Rock Midstead, may also be the remains of a barrow.

9.3.5. Other finds of prehistoric date recorded comprise two flint flakes from Charlton Mires area (HER 5062) of Neolithic or Early Bronze Age date.

9.3.6. Iron Age occupation is represented within the wider study area in the form of defended settlement sites. Four sites containing earthwork remains representing the former settlements lie within a 1 km area of the Scheme and are designated as Scheduled Monuments. One of these, Camp at West Linkhill (NHLE 1006500) abuts the Scheme Footprint to the east, at the northern end. The remainder comprise of Heiferlaw Defended Settlement (NHLE 1014080), Camp Plantation, 350 m north-west of North Charlton Mill (NHLE 1017955), and Defended Settlement 800 m SSE (south south-east) of South Charlton Farm (also known as Buckland Camp, NHLE 1014074). Chester Hill Camp is also recorded as a non-designated heritage asset (HER 5041), but the presence of an Iron Age settlement site here is unsubstantiated. The HER also holds a record called "Camp" (HER 5043) which relates to an earthwork site located to the north of Camp at West Linkhill, however this site is also currently undated.

9.3.7. There are no sites of Roman or Anglo-Saxon date recorded in the inner or wider study areas.

9.3.8. Six areas of Deserted Medieval Settlement are recorded in the study area. The largest is the Scheduled Monument North Charlton medieval village and open field system (NHLE 1018348) which extends to both the east and west side to the Scheme at the northern end. The remainder are located near Heckley House (HER 4430), Charlton Hall (HER 5054), Linkhill (HER 5055), Broxfield (HER 5650) and Denwick (HER 5711)

9.3.9. Four areas containing medieval ridge and furrow earthworks were identified in the Options Selection Stage EAR. Two of these are associated with known deserted settlements (Heckley House and West Linkhill). The other areas are located near South Charlton and at Shipperton Bridge.

9.3.10. A total of nine non-designated assets of post-medieval to 19th century have been identified and comprise of remains of two lime kilns (HER 4437, HER 5056), the site of six wells (HER 5037, 22425, 22429, 22431, 22433 and 22435), and the site of the Traveller's Rest Public House (HER 22428)

9.3.11. Just one buried archaeological asset of modern date has been identified, the Seahouses landing ground at Rennington (HER 26255). The site was used as the landing ground for 77 Squadron from 1916 to 1918.

9.3.12. A cropmark of a sub-rectangular is potentially the remains of a ditched enclosure of unknown date (HER 4440).

Main Compound

9.3.13. There are two non-designated assets recorded in the inner study area. A Mesolithic flint scatter (HER 11356) was recorded during a fieldwalking survey near West Moor Farm, approximately 200 m to the west of the compound boundary. Approximately 450 m to the south is a cropmark of a double ditched enclosure (HER 11359) identified through aerial photography.

Lionheart Enterprise Park Compound

9.3.14. Part of the compound area at Lionheart Enterprise Park has already been subject to archaeological evaluation as part of an earlier planning application (Ref. 16/04691/FUL), consisting of a geophysical survey (**Ref 9.3)** followed by targeted trial trenching (**Ref 9.4**). Three phases of geophysical survey have been undertaken, covering approximately 7 hectares of the proposed compound area (which totals approximately 14 ha). The surveys identified several possible soil-filled features.

9.3.15. The trial trenching consisted of seven 25 m by 2 m trenches and one 50 m by 2 m trenches. The trenching identified a furrow type features and drains of negligible value.

HISTORIC BUILDINGS, REGISTERED PARK AND GARDEN AND CONSERVATION AREA

Main Scheme area

9.3.16. A total of 51 built heritage assets are recorded. They consist of 42 assets designated as Listed Buildings and two designated as Scheduled Monuments (note – one of these is also a Listed Building) in the outer (1 km) Study Area, and eight non-designated heritage assets in the inner (500 m) Study Area. They comprise of:

- Heiferlaw Tower, Grade I (NHLE 1304282) and Scheduled Monument (NHLE 1014061) of high importance;
- Charlton Tower, Grade II* (NHLE 104002) of high importance;
- Second World War Zero Station, Scheduled Monument (NHLE 1014080 (part of the Iron Age Heiferlaw Defended Settlement)) of high importance;
- 40 Grade II Listed Buildings of medium importance;

- Barn and Engine house on north side of main farm building group at Broxfield, non-designated (HER 14340) of low importance;
- Three Polygonal lozenge-shaped pillboxes, non-designated (HER 4447, 19874 and 19936) of low importance;
- Spread Eagle Public House, non-designated (HER 22436) of low importance; and
- Mileposts, non-designated (HER 16836 and 16878) of low importance.

9.3.17. The Grade II Listed buildings include farmsteads, agriculture structures, domestic properties, mileposts, war memorial, a church, a limekiln and a bridge.

9.3.18. Two mileposts are located within the Scheme Footprint; Milepost 40 m north of entrance to Heckley House (NHLE 1153486) and Milepost north of Shipperton Bridge (HER 16878). Two Grade II listed buildings, Patterson Cottage (NHLE 1371080) and West Linkhall Farmhouse (NHLE 1298856), lie within 25 m of the Scheme Footprint.

9.3.19. The western boundary of the Rock Conservation Area lies just within the wider study area, although the main part of the Conservation Area and the designated assets within it lie beyond the study area. The Conservation Area is of medium importance.

9.3.20. The Alnwick Castle Grade I Registered Park and Garden (NHLE 1001041) lies at the southern end of the Scheme within the study area and is of high importance. The Registered Park and Garden covers an area approximately 1500 ha in size and can trace its origins to the medieval period, although the present park is largely a result of late 18th century landscaping. The Park contains 42 Listed Buildings, including 12 Grade I and two Grade II* Listed Buildings, of high importance. Three of these assets are located in the wider study area for the Scheme (Grade II Milestone 80 m south of Broom House Roundabout (NHLE 1042041), Malcolm's Cross and Remains of Older Cross (NHLE 1153333) and Remains of White Cross 400 m north east of Denwick Bridge (NHLE 1042042)).

Main Compound

9.3.21. There is one Grade II listed milepost of medium importance recorded within the compound boundary (NHLE 1371021) although a recent site inspection failed to locate it in this location.

9.3.22. There are eight designated built heritage assets in the wider study area. These consist of a Grade II* listed greenhouse (NHLE 1154561) of high importance, and Grade II listed church (NHLE 1371126), house (NHLE 1303774) and garden wall (NHLE 1041874) in Felton Park, approximately 950 m north-west of the compound of medium importance. The remainder comprise of a mill (NHLE 1041885), and three farmhouses (NHLE 1156133, 1042133 and 1156136) of medium importance.

9.3.23. One non-designated built heritage lies in the inner study area and consists of a property called Felshott (HER 19365), located 500 m to the north-west of low importance. It was formerly a listed building as it had structural elements of 18th to 19th century date, however these sections have been demolished and it was subsequently de-listed.

Lionheart Enterprise Park Compound

9.3.24. Four Grade II listed buildings of medium importance lie within both study areas. The nearest one to the proposed compound is Greensfield Moor Farmhouse, located approximately 500 m to the west. The other three lie approximately 800 m to the north in Alnwick Cemetery and consist of the South Chapel (NHLE 1052194), North Chapel (NHLE 1237596) and Lodge and Gates at Alnwick Cemetery (NHLE 1372336).

HISTORIC LANDSCAPES

Main Scheme area

9.3.25. Information about Historic Landscapes is derived from the Northumberland HLC. A total of 15 Historic Landscape types are recorded in the inner study area around the Scheme and are of low importance:

- Small Irregular Fields by Settlement: 17th to mid-18th century;
- Reorganised Piecemeal Enclosure: 17th to mid-18th century;
- Other Irregular Fields: 17th to mid-18th century;
- Piecemeal Enclosure: 17th to mid-18th century;
- Designed Landscape: Parkland landscape created from the 17th century onwards;
- Surveyed Enclosure (Erratic Edged, Straight Edged and Wavy-Edged): Mid-18th to 19th century;
- Other Small Surveyed Fields: Mid-18th to 19th century;

- Reorganised Piecemeal Enclosure: Pre-1860;
- Enclosed Lowland Moorland: Pre-1860;
- Road: Pre-1860;
- Late 19th Century Fields;
- Late 19th Century Woodland;
- Other 20th Century Fields;
- 20th Century Settlement; and
- 20th Century Woodland.

9.3.26. There is a high potential for the presence of hedgerows within the Scheme which meet the criteria of Historic Importance, as set out in the Hedgerow Regulations Act 1997. Any hedgerows identified as being of Historic Importance would be of low to medium importance as defined in DMRB Volume 11 Section 3 Part 2 HA208/07 Annex 5 table 5.1 and Annex 7 table 7.1.

Main Compound

9.3.27. The compound site occupies an area characterised as Surveyed Enclosure (Wavy Edged) Mid-18th to 19th century of low importance. The inner study area contains the following character types:

- Piecemeal Enclosure: 17th to mid-18th century;
- Piecemeal Enclosure: 20th century;
- Surveyed Enclosure (Erratic Edge): mid-18th to 19th century;
- Surveyed Enclosure (Wavy Edged): 20th century;
- Fields Regular: 20th century;
- Woodlands: Pre-1860;
- Settlement: Pre-1860; and
- Airfield: 20th century.

Lionheart Enterprise Park Compound

9.3.28. The Historic Landscape Character of the compound site and much of the inner study area is Piecemeal Enclosure:17th to mid-18th century of low importance. Also contained within the inner study area is Woodland: Pre-1860s and Active Industry: 20th Century of low importance.

9.4 POTENTIAL IMPACTS

BELOW-GROUND ARCHAEOLOGICAL REMAINS AND EARTHWORKS

Construction Effects

9.4.1. All direct impacts on buried archaeological remains would be permanent and irreversible. Works that have the potential to impact upon any remains present include ground levelling, topsoil stripping, the removal of existing road surfaces, construction of temporary compounds and haulage roads, and the installation of infrastructure items such as lighting columns, manholes, culverts or chambers, utilities cables, drainage pipes, balancing ponds and so forth. Any form of landscaping, including the planting of trees for screening, also has the potential to disturb buried archaeological remains.

9.4.2. Those below-ground assets which have been identified within the footprint of the Scheme have potential to be partially or wholly disturbed as a result of those construction activities listed above. These include the Scheduled Monument Prehistoric burial mound, located 420 m north-west of Linkhall (NHLE 1018499) and of national importance. There is also a potential for buried remains associated with the Scheduled Monuments Camp at West Linkhall (NHLE 1006500) and North Charlton medieval village and open field system (NHLE 1018348) to extend within the Scheme Footprint as the boundaries of these abut the scheme boundary. Any remains that are directly associated with these designated areas will be of national importance. A possible ditched enclosure identified as a cropmark on aerial photographs (HER 4440) of potential regional importance may also be directly impacted.

9.4.3. The baseline data suggest that there is potential for hitherto unknown remains associated with the Prehistoric period onwards to survive below the ploughed soil in undisturbed ground. Findspots (artefacts that have been identified and subsequently removed) are often good indicators of archaeological potential and include the Bronze Age burial (HER 5033) within the Scheme Footprint. There is potential that it is associated with further buried archaeological remains associated with prehistoric funerary activity of national importance. Similarly,

the findspot of worked flint from Charlton Mires (HER 5062) could indicate the presence of further buried archaeological assets in this area of regional importance.

9.4.4. The site of a potential rectangular enclosure of unknown date (HER 4440) is located to the west of Broxfield. The archaeological nature of this feature has yet to be determined, however if below ground remains are identified they have the potential to be of local to regional importance.

9.4.5. The evidence from the study area also demonstrates a high potential for buried remains of medieval date within the footprint of the Scheme of local to regional importance.

9.4.6. Previous archaeological investigations at the Lionheart Enterprise Park Compound indicate a low potential for buried archaeological remains within the proposed location, although the whole area has not been evaluated.

9.4.7. There is a potential for hitherto unknown remains from the Prehistoric period at the Compound at West Thirston due to the proximity of a scatter of Mesolithic flint (HER 11356) to the site and the cropmark of a double ditched enclosure (HER 11359) of regional importance. There is also a potential for medieval and post-medieval remains associated with agriculture of local to regional importance.

Operational Effects

9.4.8. There is a potential for adverse effects on the setting of buried assets during the operation of the Scheme from a loss of an element of the setting, or from a combination visual intrusion resulting from the introduction of new structures, materials and movement. There is also potential for a degradation of tranquillity, caused by the increased proximity of the Scheme to nearby assets resulting in an increase in traffic noise. This would only occur where the setting is judged to contribute to the importance of the asset.

9.4.9. The construction of the Scheme may result in a change in local drainage patterns during the operation phase due to the installation of a new highways drainage system. As a result, changes in the ground water levels could result in the decomposition or destruction of below ground archaeological remains and deposits. The Scheduled Monument Prehistoric burial mound, located 420 m north-west of Linkhall (NHLE 1018499) is located near a proposed detention basin, and is therefore recognised as at risk.

HISTORIC BUILDINGS, REGISTERED PARK AND GARDEN AND CONSERVATION AREA

Construction Effects

9.4.10. It is anticipated that construction would have a direct impact on the non-designated Milepost located within the Scheme Footprint (HER 16878) as the widening of the carriage may require its relocation or complete removal.

9.4.11. Noise caused by machinery and passing construction traffic in addition to the presence of visually intrusive compound areas is highly likely to result in a temporary adverse impact on the setting of Grade II Listed Patterson Cottage (NHLE 1371080) and West Linkhall Farmhouse (NHLE 1298856) as they all lie within 25 m of the Scheme Footprint. The construction and use of access tracks or easements could also result in temporary adverse effects on the setting on the following Grade II listed Buildings due to their close proximity

- Milepost 40 metres north of entrance to Heckley House (NHL 1153486)
- Heckley House NHL 1042044)
- Smithy at South East Corner of Main Farm building Group (NHL 1303729)
- Barn and Engine House on North Side of Main Farm building Group (NHL 1041755)
- Dovecote to East of Heckley Fence Farmhouse with Attached Wall
- Limekiln South of Kiln Plantation 700 metres south east of Rock Midstead

9.4.12. The construction phase may also have a temporary adverse impact on built heritage assets in the wider area due to changes in their setting. Assets potentially impacted include the Grade I Listed and Scheduled Monument Heiferlaw Tower (NHLE 1304282 / NHLE 1014061), the Scheduled Monument Second World War Zero Station (NHLE 1014080), the Grade I Alnwick Park and Garden (NHLE 1001041) and the 42 designated heritage assets contained within it (consisting of 12 Grade I, 2 Grade II* and 28 Grade II Listed Buildings). All are of national importance. Construction works may also result in temporary adverse impacts on the remaining 41 Grade II Listed Buildings and Rock Conservation Area which are of regional importance.

9.4.13. Non-designated built heritage assets which could see a temporary adverse impact during construction due to changes in setting comprise three World War II pillboxes (HER 19874, 19874 and 19936), the Spread Eagle Public House (HER 22436) and a second Milepost (HER 16836). The significance of these assets and the

contribution of the setting to the significance will require further assessment, however they are likely to be of local to regional importance.

9.4.14. There is a potential impact on four Grade II listed buildings of regional importance located around the Lionheart Enterprise Park Compound during the construction phase due to a change in setting.

9.4.15. The construction phase at the compound near West Thirston may have a direct impact on a Grade II listed Milepost (NHLE 1371021), although a recent site visit failed to locate the asset in this location. There is also a potential for indirect effects on one Grade II* listed building of national importance and seven Grade II listed buildings of regional importance. There is also one non-designated built heritage asset, Felshott (HER 19365), although this property has lost its historic elements and is therefore of no higher than local importance.

Operational Effects

9.4.16. There is a potential for adverse impacts on the setting of built heritage assets located around the Scheme by a combination visual intrusion resulting from the introduction of new structures, materials and movement and a degradation of tranquillity caused by the increased proximity of the Scheme once in operation. The two Grade II listed buildings located alongside the existing highway (Patterson Cottage (NHLE 1371080) and West Linkhall Farmhouse (NHLE 1298856)), are recognised as being potentially sensitive receptors due to their close proximity, although the level of impact is not known until the setting assessment is completed. There is also potential for adverse impacts on the non-designated Spread Eagle Public House (HER 22436) due to a permanent change in setting.

9.4.17. There is a potential for adverse impacts on designated and non-designated built heritage assets in the wider area due to a change in setting, however the level of impact is determined by the contribution of the setting to the importance of the asset. This will be determined though further assessment. Assets potentially impacted include the Grade I Listed and Scheduled Monument Heiferlaw Tower (NHLE 1304282 / NHLE 1014061), the Scheduled Monument Second World War Zero Station (NHLE 1014080), the Grade I Alnwick Park and Garden (NHLE 1001041) and the 42 designated heritage assets contained within it (consisting of 12 Grade I, 2 Grade II* and 28 Grade II Listed Buildings). All are of national importance. There may be impacts during operation on the remaining 41 Grade II Listed Buildings and Rock Conservation Area which are of regional importance.

9.4.18. There is a potential for the subsidence of built heritage assets as a result of any changes in the local hydrology as a result of the Scheme.

HISTORIC LANDSCAPE

Construction Effects

9.4.19. The construction of the Scheme would result in the partial loss of some elements of the Historic Landscape. However, as the construction is being undertaken largely within the existing highway footprints, the effects are anticipated to be minor. The main effects are predicted to arise from a loss of a number of locally important field boundaries that are potentially protected under the Hedgerows Regulations Act 1997. The Northumberland HLC identifies the presence of field boundaries associated with both piecemeal private enclosure and Parliamentary Enclosure, spanning the 17th to 19th centuries.

Operational Impacts

9.4.20. No impacts on the historic landscape are predicted as a result of the operation of the Scheme.

9.5 DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION

Below-Ground Archaeological Remains and Earthworks

9.5.1. Although there are nationally important Scheduled Monuments within and adjacent to the Scheme (NHLE 1018499, 1006500 and 1018348), direct impacts on the designations would be minimised as far as possible through the exclusion of the area from the Scheme Footprint and any additional construction activities. This would avoid harm to these assets as they are subject to statutory protection under the Ancient Monuments and Archaeological Areas Act 1979 (**Ref 9.5**). Where this is not possible, ways to ensure preservation in-situ would be explored, in consultation with Historic England. If disturbance is unavoidable, then a programme of archaeological evaluation in the form of geophysical survey and potentially targeted trial trench evaluation should be implemented to determine the presence, extent, level of survival of the assets. Geophysical survey

work would be undertaken in adherence to a Section 42 licence, issued by Historic England. Intrusive works would require Scheduled Monument consent from Historic England.

9.5.2. Non-intrusive archaeological investigation in the form of a geophysical survey is recommended in the areas off the existing highway in the Scheme footprint followed by a programme of pre-construction trial trenching to determine the presence, extent, significance, and level of survival of buried heritage assets. The extent of any investigation will be agreed with the County Archaeologist at NCC. An archaeological watching brief will be required during any pre-construction geotechnical ground investigations trial pits / trenches.

9.5.3. The results of these investigations can be used to devise a suitable programme of mitigation where applicable. Mitigation measures in addition to the investigation recommended should be devised in consultation with the County Archaeologist at NCC and Historic England.

9.5.4. The DCO will need to be granted before any sections of field boundaries likely to be protected under the Hedgerows Regulations Act 1997 are removed and any archaeological mitigation will be devised in consultation with NCC. This is likely to take the form of excavated sections through the boundaries and the archaeological recording of these.

9.5.5. For the ridge and furrow earthworks, an earthwork survey may be required in accordance with Historic England guidelines and through consultation. Earthwork surveys would take place before any trial trenching or other invasive investigations take place, and to inform the ES.

Historic Buildings

9.5.6. Construction may result in the removal of two mileposts (NHLE 1153486 and HER 16878). It is proposed that these assets be subject to photographic recording prior to the start of construction to create a permanent record of their existing setting. This would be followed by the careful removal of the assets and its safe storage during construction and conservation as appropriate to prevent deterioration in its condition. On completion of construction, the milestones would be reinstated as close as possible to its original location to maintain its relationship with the road. Any mitigation will be devised in consultation with Historic England and the Milestone Society.

Setting of Heritage Assets

9.5.7. There is a potential for temporary adverse impacts on heritage assets due to a change in the setting during construction and for permanent adverse impacts during operation. As the measures which could be used to mitigate the impacts are the same, they are discussed together below.

OPERATION

Below-Ground Archaeological Remains, Earthworks and Historic Buildings

9.5.8. Any adverse impacts on below ground archaeological remains, earthworks and historic buildings would occur during the construction phase and no mitigation measures would be required for the operation stage.

Setting of Heritage Assets

9.5.9. Historic England guidelines (**Ref 9.6**) for mitigation of the impact of a development on the setting of a heritage asset (including historic landscapes) suggest that in the first instance impacts are best mitigated for either by the relocation of the development or changes to its design. Where relocation of the development is not possible, good design alone may be capable of reducing the harm. Paragraph 39 reads:

'Options for reducing the harm arising from development may include the repositioning of a development or its elements, changes to its design, the creation of effective long-term visual or acoustic screening, or management measures secured by planning conditions or legal agreements. For some developments affecting setting, the design of a development may not be capable of sufficient adjustment to avoid or significantly reduce the harm, for example where impacts are caused by fundamental issues such as the proximity, location, scale, prominence or noisiness of a development. In other cases, good design may reduce or remove the harm, or provide enhancement. Here the design quality may be an important consideration in determining'

9.5.10. Enhancement may be achieved by actions including:

- Removing or re-modelling an intrusive building or feature;
- Replacement of a detrimental feature by a new and more harmonious one;
- Restoring or revealing a lost historic feature or view;
- Introducing a wholly new feature that adds to the public appreciation of the asset;

- Introducing new views (including glimpses or better framed views) that add to the public experience of the asset; or
- Improving public access to, or interpretation of, the asset including its setting.

9.5.11. Where attributes of a development affecting setting may cause some harm to significance and cannot be adjusted, screening may have a part to play in reducing harm. As screening can only mitigate negative impacts, rather than removing impacts or providing enhancement, it ought never to be regarded as a substitute for well-designed developments within the setting of heritage assets. Screening may have as intrusive an effect on the setting as the development it seeks to mitigate, so where it is necessary, it too merits careful design.

9.5.12. Mitigation measures to reduce the harm on the setting and opportunities for enhancement in setting should be devised in consultation with the County Archaeologist and Conservation Officers at NCC and Historic England.

9.6 DESCRIPTION OF THE LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION

Below-Ground Archaeology and Earthworks

9.6.1. There are likely to be significant effects on below-ground archaeology during construction through their permanent destruction and removal. The effects on the Bronze Age barrow scheduled monument (NHLE 1018499) within the Scheme would be very large adverse, due to its national importance. Any further below-ground archaeology features, such as burials, located nearby and clearly associated with the designated asset will also be judged to be of high importance and therefore the effects would also be very large adverse.

9.6.2. There are also potential significant effects on the two adjacent scheduled monuments (NHLE 1006500 and 1018348) through in-direct impacts which could be large to very large, depending on the scale and nature of the impacts.

9.6.3. Likely significant effects are also predicted for non-designated below-ground assets located within the Scheme footprint through direct impacts, including the potential prehistoric activity area in Charlton Mires (HER 5062), the site of a potential Camp (HER 5041) and the site of a potential rectangular enclosure of unknown date (HER 4440) located to the west of Broxfield. There is also a potential for currently unknown remains within the Scheme Footprint of prehistoric to modern date. The scale of effects on these is unknown until the value of the assets is ascertained through assessment and evaluation.

9.6.4. Previous archaeological investigations at the Lionheart Enterprise Park Compound has indicated a low potential for below-ground remains of any importance and therefore the significance of effects is predicted to be neutral to slight.

9.6.5. No below-ground assets have been identified within the Compound at West Thirston, however there is a potential for currently unknown below-ground remains of prehistoric, medieval and post-medieval date. The significance of the effects will be dependent on the presence and importance of below-ground assets.

9.6.6. The significance of effects on below-ground archaeology during the construction phase due to direct impacts resulting in the permanent loss of heritage assets can be reduced through mitigation measures such as preservation by record or preservation in-situ. An alternative design solution is being sought to avoid the likely significant effects on the Bronze Age barrow (NHLE 1018499).

Historic Buildings, Registered Park and Garden and Conservation Area

9.6.7. The construction phase is predicted to include a direct impact on the non-designated Milepost of low importance located within the Scheme Footprint (HER 16878) through its removal or relocation. The effect of its permanent removal will be moderate adverse, while its relocation will be slight.

9.6.8. Temporary adverse impacts are predicted due to a change in the setting of ten Grade II listed buildings of medium importance and one non-designated asset of local importance located in close proximity to the Scheme footprint and construction access tracks. The level of impact will vary depending on the nature of the impacts on the setting, and the effects will therefore vary from neutral to large adverse. The built assets consist of:

- Milepost 40 metres north of entrance to Heckley House (NHL 1153486)
- Heckley House NHL 1042044)

- Smithy at South East Corner of Main Farm Building Group (NHL 1303729)
- Yard Walls to South of Farm building (NHLE 1154641)
- Rennington Moor Farmhouse and Attached Farm building (NHLE 1041756)
- Barn and Engine House on North Side of Main Farm Building Group (NHL 1041755)
- Dovecote to East of Heckley Fence Farmhouse with Attached Wall (NHLE 1371059)
- Limekiln South of Kiln Plantation 700 metres south east of Rock Midstead (NHLE 1154647)
- Spread Eagle Public House (HER 22436)

9.6.9. Temporary significant effects may also occur on built heritage assets in the wider area through a change in setting, including Grade I Listed and Scheduled Monument Heiferlaw Tower (NHLE 1304282 / NHLE 1014061), the Scheduled Monument Second World War Zero Station (NHLE 1014080), the Grade I Alnwick Park and Garden (NHLE 1001041) and designated heritage assets contained within it, and three non-designated World War II pillboxes (HER 19874, 19874 and 19936). The scale of effects will depend on the level of impact, which requires further assessment to determine, but could range from no change to moderate adverse.

9.6.10. The temporary significant effects on the setting of four Grade II listed buildings by the Lionhead Enterprise Park Compound (NHLE 1042019, 1052194, 1237596 and 1372336) will be neutral to moderate. The temporary significant effects on the setting of built heritage assets near the compound near West Thirston (NHLE 1371021 and HER 19365) will also range from neutral to moderate.

Historic Landscapes

9.6.11. There will likely be significant effects on historic landscapes during construction through their permanent removal and alteration. The significance of effects will range from neutral to moderate, depending on the scale and nature of the impacts and the importance of the historic landscape type. This will be determined though further assessment work.

OPERATION

Below-ground Archaeology

9.6.12. Significant effects on below ground archaeology during operation will arise from impacts due to a change in hydrology. The potential for these impacts to occur, and which assets this might impact is unknown and therefore the significance of effects is unknown.

Built Heritage Assets

9.6.13. There is a potential for significant effects on designated and non-designated built heritage around due to adverse impacts on the settings of the assets. The assets effected are both designated and non-designated assets and include a conservation area and Registered Park and Garden. The level of the effect will depend on how the setting contributes to the importance of the asset, along with the scale and nature of the impacts from the operation phase of the Scheme. The significance will therefore could vary from neutral to large adverse.

9.6.14. The assets predicted to be most susceptible to significant effects are those in the closest proximity due to their direct intervisibilty with the scheme. These comprise of Patterson Cottage (NHLE 1371080) and West Linkhall Farmhouse (NHLE 1298856), which are Grade II listed buildings and the effects are predicted to be moderate adverse, and the non-designated Spread Eagle Public House, which is predicted to be slight adverse.

9.6.15. Following the implementation of mitigation measures such as good design, screening and enhancement the adverse impact on the setting of assets may be reduced, although design and enhancement will not render any impact to negligible and the impact on setting may remain significant for some assets. This statement may be revised following the undertaking of the **Detailed Level** assessment.

Historic Landscapes

9.6.16. No significant effects on historic landscapes are predicted during the construction phase.

9.7 ASSESSMENT METHODOLOGY

TOPICS AND ELEMENTS OF TOPICS TO BE SCOPED IN AND OUT

9.7.1. In accordance with the DMRB (HA 208/07), Cultural Heritage comprises World Heritage Sites (WHS), Scheduled Monuments (SM), Listed Buildings (all grades), Conservation Areas (CA), Registered Parks and

Gardens, Historic Battlefields, the Historic Landscape and non-statutory designated heritage assets including below-ground and earthwork archaeological remains. The nearest World Heritage Site is located approximately 55 km south and Historic Battlefields 25 km north-west and therefore these groups of assets are scoped out of the EIA.

9.7.2. The study area contains Scheduled Monuments, Listed Buildings, a Conservation Area, a Registered Park and Garden, non-statutory designated heritage assets, including below-ground and earthwork archaeological remains, and historic landscapes and they are **scoped in** to the EIA.

9.7.3. The designated heritage assets situated within the Alnwick Grade I Registered Park and Garden but located outside of the 1 km study area are also **scoped in** for further assessment as they contribute the importance of the Park and Garden.

LEGISLATION, POLICY AND GUIDANCE

9.7.4. Policy and plans relevant to the Scheme will be considered within the EIA and will consist of the following aspects:

- A schedule of the relevant national, regional, county and local policies, including;
  - NPPF 2018 (**Ref 9.7**)
  - NPS NN 2014 (**Ref 9.8**)
  - Alnwick District Wide Local Plan Saved Policy BE2 1997 (**Ref. 9.9)**;
  - Alnwick District Local Development Framework Policy S15 2007 (**Ref. 9.10**); and

9.7.5. Policy and plans relevant to the Scheme will be presented at Preliminary Design Stage which will form part of the ES and will consist of the following aspects:

- A schedule of the relevant national, regional, county and local policies; and
- A commentary setting out the significance of the impact of the Scheme on each policy objective.

METHODOLOGY

9.7.6. A **Detailed Level** assessment will be undertaken as defined by DMRB guidance and in compliance with the NPSNN and NPPF. The methodologies used will adhere to the following relevant professional guidelines: Chartered Institute for Archaeologists (CIfA) Standard and Guidance for Historic Environment Desk-based Assessment (2017) (**Ref 9.11**) and CIfA Code of Conduct (2014; **Ref 9.12**).

9.7.7. A **Detailed Level** desk-based assessment (DBA) as outlined in DMRB Vol 11 Section 3 Part 2 Chapter 5 will be undertaken in accordance with CIfA Standards (**Ref 9.11**) at the Preliminary Design Stage. The DBA will discuss the importance or sensitivity of the heritage assets and their settings in an international, national, county, regional or local context and present their significance using the prescribed NPPF values (artistic, archaeological, architectural and historical). The historical and archaeological context of the Scheme will also be presented, as will a strategy for further site investigation where necessary; and outline suitable mitigation measures, where possible at this stage, to avoid, reduce, or remedy adverse impacts. The assessment would include a setting assessment which would consider the impact of the Scheme on designated assets, conservation areas and historic landscapes within a 1 km study area. This assessment will be undertaken in accordance with Historic England guidelines (Historic England Good Practice in Planning: 3, 2017) (**Ref 9.6**).

9.7.8. Sources of information to be utilised will include:

- The National Heritage List England;
- The Northumberland Historic Environment Record;
- Historic mapping;
- Online academic sources; and
- Easily available secondary sources.

9.7.9. The DBA report will be included as a technical appendix and the results presented within the ES where required.

9.7.10. The ES will be supplemented with information obtained through geophysical survey of the areas away from the existing highway. The geophysical survey will be undertaken by a suitably qualified contractor and in adherence to the CIfA Standard and Guidance for Archaeological Geophysical Survey (2014; **Ref 9.13**) and the CIfA Code and Conduct (**Ref 9.12**). The aim of the geophysical survey will be to identify the presence of

buried remains which could be of archaeological origin. An archaeological assessment of any available LiDAR data will also be undertaken in order to identify above ground features of archaeological interest.

9.7.11. Depending on the results of the geophysical survey and LiDAR assessment, a targeted trial trench evaluation may be required to establish the presence and value of any buried archaeological remains within the Scheme footprint. The evaluation would be undertaken in line with the Written Scheme of Investigation prepared in consultation with NCC. Any intrusive works in the boundaries of the Scheduled Monuments will require Scheduled Monument Consent. All work will be undertaken by a suitably qualified contractor in adherence to the CIfA Standard and Guidance for Archaeological Field Evaluation (**Ref. 9.14**) and the CIfA Code and Conduct (**Ref 9.12**).

9.7.12. The reports from each of the surveys and investigations will be presented as technical appendices and the results presented in the ES.

Terminology

9.7.13. The technical terminology to be applied in the assessment process is based on that contained within Historic England guidance, Historic Environment Good Practice Advice in Planning Note 3 (**Ref. 9.6**)) and the Cultural Heritage Section (Volume 11, Section 3, Part 2) of the Design Manual for Road and Bridges (DMRB) (**Ref 9.2**). This latter document has been widely adopted throughout the heritage industry as a standard.

ASSESSMENT CRITERIA

9.7.14. Initially, the value or importance of a heritage asset is judged from very high to uncertain based on the criteria set out in DMRB (Volume 11 Section 3 Part 2 Annex 5 (Table 5.1), Annex 6 (Table 6.1) and Annex 7 (Table 7.1). These present a general guide to the attributes of cultural heritage assets and it should be noted that not all the qualities listed need be present in every case and professional judgement is used in balancing the different criteria.

9.7.15. The CIfA 'Standard and Guidance for Historic Environment Desk-based Assessment' (2017) (**Ref. 9.11**), considers that an assessment of the significance of heritage assets should identify the potential impact of proposed or predicted changes on the significance of the asset and the opportunities for reducing that impact. Policy 189 of NPPF states that this evidence should be taken into account when considering the impact of a proposal.

9.7.16. The level of harm to cultural heritage significance of the asset, or the magnitude of the impact as prescribed by DMRB, is the basis of assessing impact. In order to assess the level of harm or potential impact of any future development on built heritage or buried archaeological remains, consideration will be afforded to:

- Assessing any impact and the significance of the effects arising from any future development of the study area;
- Reviewing the evidence for past impacts that may have affected the archaeological sites of interest identified during the DBA; and
- Outlining suitable mitigation measures, where possible at this stage, to avoid, reduce, or remedy adverse impacts.

9.7.17. Key impacts have been identified as those that would potentially harm the significance of the heritage asset. Each potential impact will be determined as the predicted deviation from the baseline conditions, in accordance with current knowledge of the Site and the Scheme.

9.7.18. The magnitude, or scale of an impact is often difficult to define, but will be termed as major, moderate, minor or negligible, based on the criteria set out in DMRB (Volume 11 Section 3 Part 2 Annex 5 (Table 5.3), Annex 6 (Table 6.3) and Annex 7 (Table 7.3)).

9.7.19. The interaction between the value of the heritage asset and the potential magnitude of impact produce the impact significance. The overall significance of impact is then determined using the matrix presented in Table 5.1 of the DMRB (HA208/07).

9.8 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

9.8.1. This Scoping Report is based on currently available information.

9.8.2. The data used to compile the baseline includes information from secondary sources and is assumed to be reasonably accurate. The records from secondary sources relate to the recording of discoveries of an archaeological or cultural heritage nature and do not represent the full record of the historic environment.

10 BIODIVERSITY

10.1 INTRODUCTION

10.1.1. This Chapter considers the implications of the Scheme on biodiversity and nature conservation during the construction and operational phases. It sets out the proposed methodology for assessment and identifies likely significant effects as well as those that can be scoped out of the EIA.

10.1.2. This Chapter has been informed by the results of the Options Selection Stage EAR (**Ref. 10.1**), A1 in Northumberland: Great Crested Newt Environmental DNA and Habitat Suitability Index Survey Report (**Ref. 10.2**), A1 in Northumberland: Badger Survey Report (**Ref. 10.3**), A1 in Northumberland: Extended Phase 1 Habitat Survey Report (**Ref. 10.4**), A1 in Northumberland: Water Vole and Otter Survey Report **(Ref. 10.5),** A1 in Northumberland: Wintering Bird Survey Report (**Ref. 10.6**), A1 in Northumberland: Bat Roost Potential Survey Report 2017 (**Ref. 10.7**), A1 in Northumberland Breeding Bird Survey Report (**Ref 10.8)** and the methodology set out in DMRB Volume 11, Section 3, Part 4 Ecology and Nature Conservation and the associated IAN 130/10 – Ecology and Nature Conservation: Criteria for Impact Assessment (**Ref 10.9)**.

10.1.3. This Chapter should be read together with the introductory chapters of this Scoping Report (**Chapters 1 - 5**) as well as **Chapter 16 Assessment of Cumulative Effects**.

10.2 STUDY AREA

10.2.1. For the desk study, search areas were identified following Assessment Methods in DMRB guidance (Vol. 11, Section 3) and Guidelines for Preliminary Ecological Appraisal (**Ref 10.10**). The following search distances from the Scheme Footprint were used:

- Statutory designated sites of international and European importance – extended up to 10 km (and 30 km for bats in relation to Special Areas of Conservation (SAC));
- Non-statutory designated sites and statutory designated sites of national importance – 2 km;
- Protected and noteworthy species – 2 km; and
- Bat species – extended up to 5 km.

10.2.2. The Options Selection Stage EAR was informed by surveys undertaken within a 500 m survey area around possible Scheme designs, and included the Phase 1 habitat survey (including priority and notable, and other, habitats) and the majority of field surveys undertaken for protected and/or notable species. The survey buffer was originally chosen to ensure that ample information regarding habitats and receptors was recorded for all potential design options, prior to a finalised design being selected.

10.3 BASELINE CONDITIONS

10.3.1. The following data sources have been consulted to inform the baseline review:

- A1 in Northumberland: Option Selection EAR (**Ref. 10.1)**;
- Great Crested Newt Environmental DNA and Habitat Suitability Index Survey Report **(Ref. 10.2);**
- A1 in Northumberland: Badger Survey Report **(Ref. 10.3);**
- A1 in Northumberland: Extended Phase 1 Habitat Survey Report **(Ref. 10.4);**
- A1 in Northumberland: Water Vole and Otter Survey Report (**Ref. 10.5**);
- A1 in Northumberland: Wintering Bird Survey Report (**Ref. 10.6**);
- A1 in Northumberland: Bat Roost Potential Survey Report 2017 (**Ref. 10.7**);
- A1 in Northumberland: Breeding Bird Survey Report (**Ref. 10.8**); and
- Multi-Agency Geographic Information for the Countryside (MAGIC) website.

10.3.2. The A1 in Northumberland: Extended Phase 1 Habitat Survey Report (**Ref. 10.4**) also includes information from a data search from Environmental Records Information Centre for the North East of England (ERIC North-East).

10.3.3. Since the above reports were completed, the Main Scheme Area has been extended. These extensions encompassed land not previously covered and have been subject to desk study to inform this Scoping

exercise, including a review of existing reports and documents related to the red line boundary extensions as well as resources listed previously.

10.3.4. For the Main Compound Area, the emerging Environmental Impact Assessment for the A1 in Northumberland: Morpeth to Felton Scheme has been consulted.

10.3.5. For the Lionheart Enterprise Park Compound, the following additional sources consulted to inform baseline review of these extensions included:

- Proposed Development of land at Lionheart Business Park, Alnwick - Ecological Assessment. BSG Ecology (**Ref 10.11**);
- NCC Ecologist - Consultee Comments for Planning Application 16/04691/FUL (**Ref 10.12**).

MAIN SCHEME AREA

Designated Sites

10.3.6. The desk study found five designated sites of European or International importance within the 10 km study area and identified one statutory nature conservation site within the 2 km study area. Designated sites are detailed in **Table 12** below and shown on **Figure A7 Ecological Constraints Plan** (**Appendix A**).

Table 12 Statutory Designated Sites within the study areas

Designation	Qualifying features	Distance from the Main Scheme*
North Northumberland Dunes SAC	Annex I habitats as primary selection: ▪ Embryonic shifting dunes ▪ 'Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes')' ▪ 'Fixed coastal dunes with herbaceous vegetation ('grey dunes')' ▪ Dunes with *Salix repens* ssp. *argentea* (Salicion arenariae) ▪ Humid dune slacks Annex II Species as primary selection: ▪ Petalwort *Petalophyllum ralfsii*	6.3 km east
River Tweed SAC	Annex I habitats as primary selection: ▪ Water courses of plain to montane levels with the *Ranunculion fluitantis* and Callitricho-Batrachion vegetation Annex II Species as primary selection: ▪ Atlantic salmon *Salmo salar* ▪ Otter *Lutra* Annex II Species as qualifying feature: ▪ Sea lamprey *Petromyzon marinus* ▪ Brook lamprey *Lampetra planeri* ▪ River lamprey *Lampetra fluviatilis*	9.4 km west
Northumbria Coast SPA and Ramsar site	Annex I species during the breeding season: ▪ Little tern *Sterna albifrons* Annex I species over winter: ▪ Purple Sandpiper *Calidris maritima* ▪ Turnstone *Arenaria interpres*	5.6 km east
Berwickshire and North	Annex I habitats as primary selection: ▪ Mudflats and sandflats not covered by seawater at low tide	6.1 km east

Designation	Qualifying features	Distance from the Main Scheme*
Northumberland Coast SAC	▪ Large shallow inlets and bays ▪ Reefs ▪ Submerged or partially submerged sea caves Annex II Species as primary selection: ▪ Grey seal *Halichoerus grypus*	
Newham Fen SAC	Annex I habitats as primary selection: ▪ Alkaline fens	6.6 km north
Hulne Park LNR	Mature woodland and grassland habitats	1.5 km west
* Doesn't include the Main Compound or Lionheart Enterprise Park Compound		

10.3.7. A single Local Wildlife Site (LWS) is located approximately 2 km east of the Scheme. This is Ratcheugh Crag – Pepper Moor LWS. The site is designated for the presence of a whin grassland (a limestone-based plant community based upon the Whin Sill geology in Northumberland).

Habitats

10.3.8. An extended Phase 1 habitat survey was undertaken in June 2016 (**Ref. 10.4**). **Table 13** below identifies the habitat types identified within the 2 km study area (see **Appendix A - Figure A8 – Phase 1 Habitat Survey**), any legislative protections, and a prescribed Nature Conservation Value as given by the report.

10.3.9. A single area of ancient woodland was identified as part of the desk study. Swineclose Wood is an area of ancient semi-natural woodland 5.18 ha in size, located 1.88 km to the north-east of the Scheme (see **Appendix A - Figure A7 Ecological Constraints Plan**).

Table 13 Habitats Recorded in the Study Area

Habitat	NERC Habitat of Principal Importance	Northumberland BAP	Nature Conservation Value	
			Geographic Scale	Biodiversity Value
Amenity grassland	No	No	Less than Local	Negligible
Arable farmland	Yes (Arable field margins only)	No	Less than Local	Negligible
Bare ground	No	No	Less than Local	Negligible
Broad-leaved semi-natural woodland	Yes (Lowland mixed deciduous woodland)	Yes (Native woodland)	Regional	Medium
Broad-leaved / mixed / coniferous plantation	Yes (Lowland mixed deciduous woodland)	Yes (Native woodland)	County	Medium
Continuous bracken	No	No	Local	Low
Dense / continuous and scattered scrub	No	Yes (Listed as a component of the Trees and Hedgerows Habitat Action Plan)	Local	Low
Dry ditch	No	No	Local	Low

Habitat	NERC Habitat of Principal Importance	Northumberland BAP	Nature Conservation Value	
			Geographic Scale	Biodiversity Value
Dry heath / acid grassland mosaic	Yes (Lowland Heathland)	Yes (Heather Moorland)	County	Medium
Hedgerows	Yes (Trees and hedgerows)	Yes (Trees and hedgerows)	County	Medium
Improved grassland	No	No	Local	Low
Introduced shrub	No	No	Local	Low
Marginal vegetation	No	No	Local	Low
Marshy grassland	No	No	County	Medium
Natural acid / neutral inland cliff	No	No	Local	Low
Neutral semi-improved grassland	No	No	Local	Low
Poor semi-improved grassland	No	No	Local	Low
Quarry	No	No	Local	Low
Running water	Yes (Rivers)	Yes (Rivers and Streams	County	Medium
Scattered broad-leaved trees	No	yes	County	Medium
Spoil	No	No	Local	Low
Standing water	Yes (Ponds)	Yes (Ponds)	County	Medium
Tall ruderal	No	No	Less than Local	Negligible
Wall	No	No	Less than Local	Negligible

10.3.10. The habitats of importance are described in detail below in **Table 14**.

Table 14 Descriptions of Priority Habitats

Habitat	Description
Arable – Field Margins	Arable fields were the most extensive habitat type recorded within the survey area and were mainly bounded by native species-poor hedgerows or species-poor hedgerows with associated dry ditches. The field margins associated with arable land within the study areas were recorded as being of limited botanical interest, mainly dominated by a narrow strip of improved grassland or tall ruderal vegetation.
Broad-leaved semi-natural woodland	Immediately to the south- east of Islaford Bridge at grid reference NU 176 183, is an area of broad-leaved semi-natural woodland comprising veteran pedunculate oaks *Quercus robur*. Additional groups of veteran pedunculate

Habitat	Description
	oaks were noted on an embankment located 100 m directly to the east of Islaford Bridge and close to Heiferlaw Bridge adjacent to the B6341.
Broad-leaved / mixed / coniferous plantation	Broad-leaved plantation woodland was extensive through the survey area, dominating the road verges of the A1. Newly planted broadleaved plantation was recorded adjacent to South Charlton Bog, whilst a remnant broadleaved plantation woodland comprising mature and veteran ash and oak was recorded at the edge of Murdie's Covert conifer plantation appearing to be the remnants of broadleaved plantation woodland. There are two coniferous plantations present within the survey area; Lodge Plantation is dominated by Scot's pine and is adjacent to Shipperton Burn; and Heater Wood is located north-west of West Linkhall and is dominated by Scot's pine and spruces. Mixed plantations are extensively found throughout the survey area, including at Edlington Dean, Craggy Wood, Murdies' Covert and Ellsnook Plantation.
Dry heath / acid grassland mosaic	North of Heckley House at grid reference NU 187 164 is a mosaic of habitats that includes dry heath and covers an area of approximately 1 ha. The area comprises rowan, oak and Scot's pine woodland atop the crag descending into bracken and heather *Calluna vulgaris*, gorse and bilberry *Vaccinium myrtillus* and grasses such as wavy hair grass *Deschampsia flexuosa*.
Hedgerows	The field boundaries across the survey area predominantly comprised species-poor hedgerows, dominated by hawthorn, with less frequent species comprising elder, blackthorn, holly, ash and beech. Where standard trees were present in hedgerows, these were predominantly ash and oak species.
Running water	A total of 17 watercourses including Shipperton Burn and Charlton Burn were present within the study area. Six watercourses run directly beneath the A1 within the Scheme boundary.
Standing water	A total of 10 waterbodies have been recorded within the study area. The ponds were of moderate or good water quality and supported good populations of macrophytes including yellow water lily (*Nuphar lutea*), bog pondweed (*Potamogeton polygonifolius*), common duckweed (*Lemna minor*), pond water crowfoot (*Ranunculus peltatus*) and sphagnum mosses (*Sphagnum* spp.).

Great crested newts

10.3.15. The Great Crested Newt Environmental DNA and Habitat Suitability Index Survey Report (**Ref. 10.2**) identified waterbodies that were suitable to support populations of great crested newts *Triturus cristatus*, see **Table 15**. These were subject to both Habitat Suitability Index (HSI) assessments and environmental DNA (eDNA) surveys in April 2016, in line with standard protocols published by Fera.

10.3.16. The desk study undertaken in conjunction with the 2016 surveys identified two records of great crested newt from between 1983 and 2005 returned from ERIC North-East.

Table 15 Great crested newt waterbody assessments

Pond Number	Grid Reference	HSI Score	HSI Category	eDNA Result (2016)	2018 Survey Type
1	NU 18643 17240	0.64	Average	Negative	Presence/absence

Pond Number	Grid Reference	HSI Score	HSI Category	eDNA Result (2016)	2018 Survey Type
2	NU 18428 17353	0.56	Below Average	Not Surveyed	Presence/absence
3	NU 17927 18540	0.68	Average	Negative	Presence/absence
4	NU 18020 18578	0.65	Average	Negative	Presence/absence
5	NU 18153 18643	0.84	Excellent	Negative	Presence/absence
6	NU 19013 20120	0.61	Average	Not Surveyed	eDNA
7	NU 18301 20789	0.66	Average	Negative	No surveys
8	NU 17553 20960	0.45	Poor	Negative	No surveys
9	NU 17452 21127	0.79	Good	Negative	Presence/absence
10	NU 16604 22938	0.36	Poor	Not Surveyed	No survey

10.3.17. **Table 15** also details the results of the eDNA surveys for the 10 waterbodies surveyed in 2016. Ponds 2 and 6 were identified during the course of further surveys, with their discovery outside the available timeframe for eDNA survey, whilst Pond 10 was not subject to eDNA survey due to access restrictions.

Reptiles

10.3.18. ERIC North-East provided no records of reptiles for the study area. Habitats within the study area provide suitability to support common and widespread reptile species. Targeted surveys to determine presence / likely absence using artificial refugia will be undertaken in areas of high suitability in September 2018 and April 2019.

Breeding Birds

10.3.19. Breeding bird surveys were carried out during 2016 and reported in the A1 in Northumberland: Breeding Bird Survey Report (**Ref. 10.12**). These surveys recorded a total of 84 bird species from within the study area, including five species listed on Schedule 1 of the Wildlife and Countryside Act (WCA) 1981. The species of conservation concern are listed below in **Table 16**.

Table 16 Selected Breeding Bird Results from 2016 Surveys (Ref. 10.12)

Species	Scientific Name	Breeding Status	Conservation Status
Barn owl	*Tyto alba*	Probable	Schedule 1, LBAP
Black-headed gull	*Chroicocephalus ridibundus*	Non-breeding	Amber BoCC
Brambling	*Fringilla montifringilla*	Non-breeding	Schedule 1
Bullfinch	*Pyrrhula pyrrhula*	Confirmed	Amber BoCC, NERC
Common crossbill	*Loxia curvirostra*	Possible	Schedule 1
Common gull	*Larus canus*	Non-breeding	Amber BoCC
Curlew	*Numenius arquata*	Possible	Red BoCC, LBAP, NERC

Species	Scientific Name	Breeding Status	Conservation Status
Dunnock	*Prunella modularis*	Probable	Amber BoCC, NERC
Fieldfare	*Turdus pilaris*	Non-breeding	Red BoCC, Schedule 1
Gadwall	*Anas strepera*	Probable	Amber BoCC
Golden plover	*Pluvialis apricaria*	Non-breeding	LBAP, Annex 1
Great black-backed gull	*Larus marinus*	Non-breeding	Amber BoCC
Grey partridge	*Perdix perdix*	Probable	Red BoCC, LBAP, NERC
Grey wagtail	*Motacilla cinerea*	Confirmed	Red BoCC, LBAP
Greylag goose	*Anser anser*	Confirmed	Amber BoCC
Herring gull	*Larus argentatus*	Non-breeding	Red BoCC, NERC
House martin	*Delichon urbicum*	Confirmed	Amber BoCC, LBAP
House sparrow	*Passer domesticus*	Confirmed	Red BoCC, LBAP, NERC
Kestrel	*Falco tinnunculus*	Probable	Amber BoCC, LBAP
Lapwing	*Vanellus vanellus*	Confirmed	Red BoCC, LBAP, NERC
Lesser black-backed gull	*Larus fuscus*	Non-breeding	Amber BoCC
Lesser redpoll	*Acanthis cabaret*	Probable	Red BoCC, LBAP, NERC
Linnet	*Linaria cannabina*	Probable	Red BoCC, LBAP, NERC
Mallard	*Anas platyrhynchos*	Probable	Amber BoCC
Mistle thrush	*Turdus viscivorus*	Confirmed	Red BoCC, LBAP
Mute swan	*Cygnus olor*	Possible	Amber BoCC
Oystercatcher	*Haematopus ostralegus*	Probable	Amber BoCC
Pink-footed goose	*Anser brachyrynchus*	Non-breeding	Amber BoCC, LBAP
Redshank	*Tringa tetanus*	Possible	Amber BoCC, LBAP
Redwing	*Turdus iliacus*	Non-breeding	Red BoCC, Schedule 1
Reed bunting	*Emberiza schoeniclus*	Probable	Amber BoCC, LBAP, NERC
Shelduck	*Tadorna tadorna*	Probable	Amber BoCC, LBAP
Skylark	*Alauda arvensis*	Confirmed	Red BoCC, LBAP, NERC
Song thrush	*Turdus philomelos*	Confirmed	Red BoCC, LBAP, NERC
Starling	*Sturnus vulgaris*	Confirmed	Red BoCC, LBAP, NERC
Stock dove	*Columba oenas*	Probable	Amber BoCC
Swallow	*Hirundo rustica*	Confirmed	LBAP
Swift	*Apus apus*	Non-breeding	Amber BoCC, LBAP

Species	Scientific Name	Breeding Status	Conservation Status
Teal	*Anas crecca*	Possible	Amber BoCC
Tree sparrow	*Passer montanus*	Confirmed	Red BoCC, LBAP, NERC
Willow warbler	*Phylloscopus trochilus*	Probable	Amber BoCC, LBAP
Woodcock	*Scolopax rusticola*	Possible	Red BoCC, LBAP
Yellow wagtail	*Motacilla flava*	Probable	Red BoCC, LBAP, NERC
Yellowhammer	*Emberiza citrinella*	Probable	Red BoCC, LBAP, NERC

10.3.20. Based on the results of the work, the breeding bird assemblage was evaluated as of District Importance. The population of gadwall *Anas strepera* recorded within the study area is considered to be of Regional Importance as it represents almost 4% of the north-east regional population. The population of yellow wagtail *Motacilla flava* recorded within the survey area exceeds 1% of the Northumbria breeding population and was therefore valued as of County Importance.

10.3.21. In cognisance of the limited footprint of the Scheme, further breeding bird surveys have been scoped out from the schedule of surveys, with information gathered to date sufficient to inform the assessment. Habitats under the Scheme Footprint are common and widespread in the geographic area, and therefore impacts upon the species assemblage recorded during surveys is anticipated to be limited given the presence of suitable supporting habitat beyond the Scheme.

Wintering Birds

10.3.22. Surveys were undertaken between October 2016 and February 2017 (**Ref. 10.6**). The surveys found that the species assemblage throughout the survey area was typical of the arable and pastoral farmland habitats throughout the wider area, with the winter assemblage being assessed as of County Importance. No individual species was found to be of national importance, as they did not occur in numbers that exceeded 1% of the national population. Eighteen species were recorded in numbers that exceeded 1% of the Northumbria population and therefore are considered to be of County Importance. These species are shown below in **Table 17**.

Table 17 Wintering Birds of County Importance (peak counts as recorded during a single wintering bird survey)

Species	Scientific Name	Peak Count
Twite	*Linaria flavirostris*	14
Pink-footed goose	*Anser brachyrynchus*	1127
Herring gull	*Larus argentatus*	2064
Redwing	*Turdus iliacus*	1244
Lapwing	*Vanellus vanellus*	1009
Lesser black-backed gull	*Larus fuscus*	4
Teal	*Anas crecca*	279
Golden plover	*Pluvialis apricaria*	383
Peregrine	*Falco peregrinus*	3
Goshawk	*Accipiter gentilis*	1
Shoveler	*Anas clypeata*	1
Common gull	*Larus canus*	539

Species	Scientific Name	Peak Count
Linnet	*Linaria cannabina*	507
Fieldfare	*Turdus pilaris*	284
Starling	*Strunus vulgaris*	1301
Tree sparrow	*Passer montanus*	150
Greylag goose	*Anser anser*	33
Willow tit	*Poecile montanus*	1

10.3.23. In cognisance of the limited footprint of the Scheme, further wintering bird surveys have been scoped out from the schedule of surveys, with information gathered to date sufficient to inform the assessment. Habitats under the Scheme Footprint are common and widespread in the geographic area, and therefore impacts upon the species assemblage recorded during surveys is anticipated to be limited given the presence of suitable supporting habitat beyond the Scheme.

Barn Owl

10.3.24. Information provided by ERIC North-East illustrates that there were three records of barn owl in the study area, however, exact locations of these records are not available due to the high-level grid reference provided with the records. Barn owl was recorded during the breeding bird surveys (**Ref. 10.12**) at the southern end of Scheme and outwith 50 m of the existing A1 carriageway. Further surveys of this species, to include vantage point surveys and inspections of potential roost locations (farm buildings) are scheduled to be completed as part of the suite of protected species surveys.

Badger

10.3.25. A total of seven records of badger were returned from ERIC North-East. Five of these records were of road casualties, with the most recent from 1988, though three were undated. The remaining two records were of badger setts, none of which were within 1 km of the proposed works.

10.3.26. Surveys of the A1 verges were not undertaken due to health and safety concerns over working next to a live carriageway, and therefore badgers may be present within the soft estate. Pre-construction surveys will encompass a search for evidence of badgers within the soft estate prior to works taking place. In the unlikely event evidence of badgers is recorded during these surveys, works will cease and appropriate action taken to ensure no contravention of relevant wildlife legislation. Further surveys or action may be required in the event evidence of badger activity/presence is recorded (e.g. encompassing camera trap monitoring of a sett).

10.3.27. Surveys of land and features (e.g. hedgerows) were completed from field side where access allowed. It is therefore considered that the lack of direct survey of roadside verges does not represent a significant risk, as it is assumed that evidence of badger activity/presence would likely be discovered in proximity to any unsurveyed verges.

Bats

10.3.28. The desk study identified 57 bat roosts within 5 km of the Scheme. These comprised 15 common pipistrelle roosts, 14 soprano pipistrelle roosts; one unidentified pipistrelle species roost, four whiskered bat / Brandt's bat roosts, 13 Natterer's bat roosts, seven brown long-eared bat roosts and three roosts associated with unidentified bat species.

10.3.29. During the Bat Roost Potential (BRP) surveys, undertaken in 2016, trees and woodlands which were found to have less than low potential were discounted and not recorded. A total of four woodlands and 84 individual trees of low potential or above were assessed (see **Table 18**).

Table 18 Bat Roost Potential Results for Trees and Woodlands

Bat Roost Potential Category	Individual Trees	Woodlands
Confirmed Roost	0	0
High	12	1
Moderate	29	0

Bat Roost Potential Category	Individual Trees	Woodlands
Low	43	3

10.3.30. Seventeen buildings were assessed for their potential to support a bat roost. A single roost of an unidentified bat species was confirmed at grid reference NU 174 212, located within 50 m of the existing A1 carriageway, from anecdotal evidence from the property owners. The remaining 16 buildings were assessed as follows;

- High BRP – 1;
- Moderate BRP – 2;
- Low BRP – 7; and
- Negligible BRP – 6.

10.3.31. The habitat quality assessments identified that most habitats within the study area (e.g. arable and pastoral) provided limited foraging opportunities for bats. However, the study area does provide some areas such as hedgerows and watercourses that may be of higher importance to bat species.

10.3.32. Emergence / re-entry surveys on buildings and trees that have been identified as having BRP are scheduled to be surveyed in line with standard Bat Conservation Trust (BCT) Guidelines in 2018.

10.3.33. Landscape scale effects on bats will be investigated by surveys undertaken during 2018 and 2019 using BCT and Defra methodologies for transect surveys and assessments of crossing points.

Water Vole

10.3.34. The desk study returned one record of water vole within 2 km in the study area. Water vole field signs were recorded on five watercourses within the study area. These records are shown below in **Table 19**.

Table 19 Water Vole Field Survey Results (Ref. 10.5)

Watercourse	Grid Reference		Field Signs				
	At Start	At End	Latrines / Droppings	Burrows	Prints	Feeding Remains	Runs / Paths
Shipperton Burn	NU167220	NU174220	0	2	3	0	0
Field Ditch	NU178212	NU175202	0	1	1	0	0
Kiln Plantation Ditch	NU188201	NU191201	0	3	1	0	0
Denwick Burn	NU191167	NU198150	0	1	0	0	0
White House Burn	NU183187	NU186188	2	3	3	0	1

10.3.35. Repeat water vole surveys are scheduled to be undertaken in 2018. Surveys have been subject to disturbance due to land access issues, dense vegetation and the presence of livestock. No evidence of water vole was recorded during the first round of survey visits. A second round of surveys are to be completed during Q3 2018.

10.3.36. One American mink scat was recorded at Shipperton Burn. No grid reference was given for this record. Further evidence of mink was recorded during the 2018 surveys at White House Burn.

Otter

10.3.37. Information provided by ERIC North-East shows that there were four records of otter in the study area. The otter surveys undertaken in 2016 found no otter field signs within 250 m of the Scheme. No further work for this species is scheduled, however, field signs will be recorded if found during the scheduled water vole surveys.

Red Squirrel

10.3.38. The desk study returned 65 records of red squirrel from ERIC North-East. Several woodlands have been identified as having the potential to support red squirrel within the study area. Surveys for this species are scheduled within appropriate habitat across the Scheme for 2018.

Terrestrial Invertebrates

10.3.39. The desk study undertaken as part of the Extended Phase 1 Habitat Survey identified one notable terrestrial invertebrate species, the dingy skipper *Erynnis tages*. In cognisance of a lack of notable/protected invertebrate species records returned during the desk study, and factoring in the prevailing habitat types bounding the Scheme, namely arable and grazing fields, it is further targeted terrestrial invertebrate surveys have been scoped out, and no further works are scheduled.

Aquatic Invertebrates and Fish

10.3.40. The desk study undertaken as part of the Extended Phase 1 Habitat survey identified 11 invertebrate species listed within annexes or schedules of relevant legislature and regulations. With watercourses and bodies located across the Scheme with the potential to support species including white-clawed crayfish *Austropotamiobius pallipes* and yellow mayfly *Potamathus luteus*.

10.3.41. Watercourses across the survey area were additionally considered suitable to support a range of fish species, with desk study results returning records of seven species listed within annexes and schedules of pertinent legislature drivers and regulations including Atlantic Salmon *Salmo salar* and bullhead *Cotus gobio*.

10.3.42. An aquatic walkover survey has been completed and has informed of suitable habitat with need for further targeted surveys/taxon surveys (e.g. electrofishing) which will be completed as part of the future survey schedule.

MAIN COMPOUND

10.3.43. The desk study found a single statutory nature conservation site within the 2 km study area; the River Coquet and Coquet Valley Woodlands SSSI. This site, comprising the southern bank of the river, is located approximately 580 m north of the main compound location at its nearest point, and is notified for a number of woodland communities and riverine habitats whilst also being notified for otter, Atlantic salmon and lamprey species. Dukes Bank Ancient Woodland is additionally encompassed within the boundary of the SSSI and listed on the Ancient Woodland Inventory.

10.3.44. The northern bank of the river is designated as a Local Wildlife Site (LWS) - Coquet River Felton Park. Whilst woodland encompassed within the LWS is not listed on the ancient woodland inventory, its composition and structure is akin to that of ancient woodland character.

10.3.45. A single EPS licence for soprano pipistrelle was recorded within 2 km of the main compound location. This record is located approximately 1.3 km north-east of the proposed main compound.

10.3.46. Surveys have been undertaken in reference to this compound location for the A1 in Northumberland: Morpeth to Felton Scheme. The site compound comprises arable fields with semi-improved grassland margins, species-poor hedgerow boundaries, and scrub bordering the northern boundary of the area. To date, no significant ecological constraints have been recorded.

10.3.47. In cognisance of the habitats recorded during the Phase 1 habitat survey, habitats along the boundaries of the proposed compound location provide opportunities for nesting birds, whilst protected and/or notable species surveys will be required to wholly assess the suitability of the site to support such species.

LIONHEART ENTERPRISE PARK COMPOUND

10.3.48. The desk study found no statutory nature conservation sites within the 2 km study area.

10.3.49. Ecological assessment of a smaller area within the proposed compound, completed by BSG in 2016 (**Ref 10.8**), recorded prevailing habitat to include two arable fields with intact species-poor hedgerow boundaries on some aspects. Limited grassland and trees were present across the survey area and no evidence of protected species was recorded.

10.3.50. Through interrogation of aerial imagery, the area of the proposed compound extends beyond the area surveyed by BSG to further encompass more of the arable fields and likely hedgerow boundaries.

10.3.51. Two EPS licences were recorded within 2 km of the Lionheart Enterprise Park compound. Both records are for common pipistrelle and are located approximately 580 m and 1.2 km to the north east of the proposed compound. Both records are severed from the proposed compound by the A1.

10.3.52. Habitats at the boundary of the proposed compound location provide some value for nesting birds where clearance is required for access.

10.3.53. As previous BSG studies have only encompassed a small area of the proposed compound location and desk based data for the area is lacking, additional survey effort in search of protected species is required. Surveys will likely include bat HSA of buildings and trees, badger survey, and otter survey of the watercourse located south of the proposed compound area. Additional targeted species surveys may be required following an initial walkover survey of the proposed compound location.

10.4 POTENTIAL IMPACTS

10.4.1. At this stage, specific potential impacts upon ecological receptors cannot be fully assessed as the results of the full suite of surveys is not available. However, the key biodiversity issues for the main scheme area, main compound and Lionheart Enterprise Park compound have been identified. A high-level summary of the potential impacts of construction and operational / post-construction is provided below.

CONSTRUCTION

10.4.2. Potential impacts that would likely affect important ecological features as a result of the Scheme include:

- Direct loss and / or disruption of habitats including hedgerows and plantation woodland;
- Damage to retained habitats during construction, as a result of, for example, accidental pollution, discharge of materials or hydrological effects;
- Indirect impacts upon habitats and protected / notable species as a result of disturbance (e.g. noise, vibration and lighting);
- Impacts on bats, birds and fish through additional road lighting during the construction phase of the Scheme (e.g. lighting near suitable habitat for bats such as the trees adjacent to the roadside or in close proximity to watercourses used by migratory fish);
- Fragmentation of existing roadside habitat as a result of the construction of the Scheme;
- Direct mortality of birds and mammals (including bats) through construction activities;
- Disruption of local watercourses and drainage patterns; and
- Destruction or disturbance of badger setts, if located within 100 m of the Scheme.

OPERATIONAL/POST-CONSTRUCTION

10.4.3. The effects on ecological receptors, which would potentially occur as a result of the operation of the Scheme include:

- Worsening of severance, by widening the division between habitats and or wildlife corridors such as badger or bat commuting routes, barn owl foraging territory etc.;
- Disturbance to species (e.g. bats) from increased levels of light, noise and pollution;
- Direct mortality of birds and mammals (including bats) through operation of the Scheme (traffic accidents);
- Polluted road runoff affecting the water environment of roadside streams and drains;
- Impacts on bats and birds through potential changes in lighting dynamics; and
- Impacts on vegetation adjacent to the A1 from polluted spray from road traffic.

10.5 DESIGN, MITIGATION AND ENHANCEMENT MEASURES

10.5.1. Avoidance and mitigation measures will be further investigated once Scheme specific details are known and associated impacts assessed as part of the EIA during this Preliminary Design Stage.

10.5.2. Where planting is required, it should be native species and locally sourced (where practicable). This ensures that planting is suitable for local species likely to use them.

10.5.3. The Scheme would seek to achieve no net loss in line with the Highways England Biodiversity Plan (**Ref. 10.14)**. An assessment of the Scheme in relation to the Highways England No Net Loss requirements will be undertaken.

10.5.4. Enhancement of existing and / or replacement habitats lost, as well as those included in additional landscaping, should focus on the provision of locally sourced native tree species, which support large numbers of invertebrates, to maximise foraging and commuting resources for bats and birds. These recommendations will be picked up through landscape proposals.

10.5.5. Based on the findings of the assessments, mitigation measures leading to avoidance, reduction or compensation of adverse effects will be identified prior to an evaluation of the effects of impacts (i.e. this will constitute 'embedded' Scheme mitigation). Typical mitigation measures may include wildlife fencing, compensatory planting, habitat creation, adoption of prescribed working practices, and programming to avoid or reduce disturbance.

10.5.6. Monitoring requirements will be determined once full results of all surveys are known and when Scheme-specific details are identified, associated impacts assessed, and mitigation requirements understood.

10.6 DESCRIPTION OF THE LIKELY SIGNIFICANT EFFECTS

10.6.1. Following provision of the field survey results, the findings will be evaluated and presented in the EIA which will describe the methodologies employed; results of consultation and field surveys; potential impacts; mitigation measures required to ameliorate identified potential impacts; and an assessment of significant impacts. Potential significant impacts on biodiversity will be assessed and suitable enhancement measures will be recommended to seek to achieve no net loss in biodiversity.

10.7 ASSESSMENT METHODOLOGY

TOPICS AND ELEMENTS OF TOPICS TO BE SCOPED IN AND OUT

10.7.1. All designated statutory and non-statutory sites (including woodland listed within the Ancient Woodland Inventory), including those identified within 2 km of proposed compound locations, are **scoped out** of the EIA as the Scheme is not likely to generate significant impacts upon them due to:

- the distances between the Scheme and the sites of interest;
- the sites' qualifying features for designation; and
- and in cognisance that the majority of the Scheme works are 'online' with a restricted construction footprint.

10.7.2. Given the presence of sites of European importance identified within 10 km of the Scheme a Habitat Regulations Appraisal Screening Assessment will be required in respect of the Scheme.

10.7.3. The following habitats, recorded within the survey area, have been **scoped in** to the EIA owing to their listing as Habitats of Principal Importance (in part or in full) under the NERC Act (2006). These habitats apply to the Scheme Footprint, Main Compound and Lionheart Enterprise Park Compound:

- Arable field margins;
- Hedgerows;
- Lowland heath – encompassing dry heath/acid grassland mosaic recorded on Site;
- Lowland mixed deciduous woodland – encompassing broadleaved/mixed/coniferous plantation and broadleaved semi-natural woodland recorded on Site;
- Running Water - Rivers and streams; and
- Standing water.

10.7.4. The following protected and or notable species are **scoped in** to the EIA as they have been recorded within the survey area or are pending further survey results. These further surveys will encompass the Scheme Footprint, Main Compound and Lionheart Enterprise Park Compound:

- Badger;
- Bats;
- Great Crested Newt;
- Water Vole;
- Birds, including Barn Owl;
- Reptiles;
- Red squirrel; and
- Terrestrial invertebrates.

LEGISLATION, POLICY AND GUIDANCE

10.7.5. Legislation relevant to the Scheme will be presented in the ES and will consist of the following aspects:

- The Conservation of Habitats and Species Regulations (Habitats Regulations) 2017;
- The Wildlife and Countryside Act (WCA) 1981 (As Amended);
- Countryside Rights of Way (CROW) Act 2000;
- The Natural Environment and Rural Communities (NERC) Act 2006;
- The Hedgerows Regulations 1997;
- The Environment Act 1995;
- Protection of Badgers Act 1992; and
- The Wild Mammals (Protection) Act 1996.

10.7.6. The following policy and guidance will underpin the assessment and will be described in detail in the assessment:

- The UK Post-2010 Biodiversity Framework (2011-2020); Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services;
- NPPF 2018;
- NPSNN;
- UK Biodiversity Action Plan (UKBAP);
- Northumberland Local Biodiversity Action Plan (LBAP);
- Alnwick District Wide Local Plan;
- Highways England Biodiversity Action Plan; and
- Birds of Conservation Concern (BoCC) 4 (Eaton et al.) 2015.

10.7.7. Policy and plans relevant to the Scheme will be presented at Preliminary Design Stage which will form part of the ES and will consist of the following aspects:

- A schedule of the relevant national, regional, county and local policies; and
- A commentary setting out the significance of the impact of the Scheme on each policy objective.

METHODOLOGY

10.7.8. The ecological assessment will be undertaken following a modified approach combining guidance and methods prescribed in the CIEEM Guidelines for Ecological Impact Assessment and Highways Agency IAN 130/10, which supplements the DMRB Volume 11, Section 3, Part 4.

10.7.9. In addition to guidance detailed above, the assessment of ecological impacts will be completed with reference to pertinent and relevant guidance, for example:

- Institute of Environmental Assessment (IEA) (1995) Guidelines for Baseline Ecological Assessment;
- Highways Agency (2001) DMRB Volume 10, Section 4 Nature Conservation;
- Highways Agency (2006) Best Practice in Enhancement of Highways Design for Bats; and
- Highways Agency (2008) IAN 116/08 Nature Conservation Advice in Relation to Bats.

SIGNIFICANCE CRITERIA

10.7.10. In order to characterise and assess the impacts of the Scheme on habitats and species, IAN130/10 will be used as the current best approach, building on existing advice as set out in DMRB Volume 11, Section 3, Part 4.

10.7.11. In order to characterise ecological impacts, the most valuable ecological resources that may be impacted by the Scheme are identified. The value given to an ecological receptor takes into account any statutory or non-statutory designations, the intrinsic value of the receptor and whether it supports legally protected or notable species. Consideration will be given to the value of the species or habitat and its conservation status at a geographic level taking population size, life cycle, rarity and/or distribution into account. Each ecological resource will be assessed as being valuable, or potentially valuable, within a geographic frame of reference as set out in the resource valuation guidance in IAN 130/10 Ecology and Nature Conservation: Criteria for Impact Assessment. **Table 20 s**ets out examples of resource valuation based on geographical level (adapted from IAN 130/10 due to changes in policy and guidance including the replacement of the UK Biodiversity Action Plan (BAP) with the UK Post-2010 Biodiversity Framework). The resource valuation is further informed by CIEEM's Guidelines to improve further the value classification accuracy.

Table 20 Factors for Assessing the Value of Ecological Receptors

Level of Value	Examples
International or European	Natura 2000 sites including: Sites of Community Importance (SCIs); Special Protection Areas (SPAs); potential SPAs (pSPAs); Special Areas of Conservation (SACs); candidate or possible SACs (cSACs or pSACs); and Wetlands of International Importance (Ramsar sites). Biogenetic Reserves, World Heritage Sites, and Biosphere Reserves. Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such. Resident, or regularly occurring, populations of species which may be considered at an International or European level where: the loss of these populations would adversely affect the conservation status or distribution of the species at this geographic scale; or the population forms a critical part of a wider population at this scale; or the species is at a critical phase of its life cycle at this scale.
UK or National	Designated sites including: Sites of Special Scientific Interest (SSSIs); Marine Protected Areas (MPAs) including Marine Conservation Zones (MCZs); and National Nature Reserves (NNRs). Areas which meet the published selection criteria (e.g. JNCC (1998)) for those sites listed above but which are not themselves designated as such. Habitats of Principal Importance in accordance with Section 41 of the Natural Environment and Rural Communities Act (2006). Areas of Ancient Woodland – i.e. woodland listed within the Ancient Woodland Inventory. Resident, or regularly occurring, populations of species which may be considered at an International, European, UK or National level where: the loss of these populations would adversely affect the conservation status or distribution of the species at this scale; or the population forms a critical part of a wider population at this scale; or the species is at a critical phase of its life cycle at this scale.
Regional	Habitats of Principal Importance; areas of key/priority habitat identified as being of Regional value in the appropriate Natural Area Profile (or equivalent); areas that have been identified by regional plans or strategies as areas for restoration or re-creation of priority habitats. Resident, or regularly occurring, populations of species which may be considered at an International, European, UK or National level and Species of Principal Importance where: the loss of these populations would adversely affect the conservation status or distribution of the wider species at this scale; or the population forms a critical part of a wider population; or the species is at a critical phase of its life cycle.

Level of Value	Examples
County	Designated sites including: Sites of Nature Conservation Importance (SNCIs); County Wildlife Sites (CWSs); Local Nature Reserves (LNRs) designated in the county or unitary authority area context. Areas which meet the published selection criteria for those sites listed above but which are not themselves designated as such. Areas of key/priority habitats identified win the Local BAP; and areas of habitat identified in the appropriate Natural Area Profile (or equivalent). Resident, or regularly occurring, populations of species which may be considered at an International, European, UK or National level where: the loss of these populations would adversely affect the conservation status or distribution of the species across the County or Unitary Authority Area; or the population forms a critical part of a wider population; or the species is at a critical phase of its life cycle.
Local	Designated sites including: Local Nature Reserves (LNRs) designated in the local context. Trees that are protected by Tree Preservation Orders (TPOs). Areas of habitats; or populations/communities of species considered to appreciably enrich the habitat resource within the local context (such as veteran trees), including features of value for migration, dispersal, or genetic exchange.

10.7.12. Once the evaluation of ecological resources has been carried out, the assessment will identify potential changes arising from proposed activities during the construction and operation of the Scheme that may affect receptors. In accordance with the DMRB (Volume 11, Section 3, Part 4) and CIEEM, this will take account of design mitigation measures only (i.e. embedded mitigation; in the absence of any other mitigation), thus providing clear information regarding the unmitigated impacts to inform the identification of appropriate mitigation and/or compensation requirements.

10.7.13. Characterisation of ecological impacts upon each receptor requires the determination of a range of parameters to inform the determination of impact significance. The criteria presented in Table 2 in IAN 130/10 will be used to characterise the ecological impact. These criteria take account of both direct loss of habitat and ecological resources through land take and perceived indirect impacts such as pollution and habitat fragmentation.

10.7.14. Once impacts are characterised, proposals for mitigation, compensation and enhancement will be considered, with the aim of avoiding or reducing the significance of impacts. Subsequent to the mitigation proposals, the overall residual significance of impacts on each receptor will be assessed. Using the receptor value ascertained from Table 9, and the characterisation impact table presented in Table 2 of IAN 130/10, an overall significance of effect category can be determined. This approach is presented in Table 3 of IAN 130/10.

10.8 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

10.8.1. This Scoping Report is based on information available at the time of writing. Information on the site, as well as the developing Scheme design, is therefore subject to change.

10.8.2. Reports from 2016/2017 were informed by surveys undertaken utilising previous iterations of the red line boundary, therefore some information and assessments from these reports may no longer be pertinent (given subsequent revisions to the redline boundary).

10.8.3. As previously indicated, the full suite of ecological survey findings is not yet available, with surveys continuing through 2018 and into 2019. This scoping report has been informed by results of previous surveys undertaken during 2015/2016 in response to a previous design/redline boundary, whilst also being bolstered by initial 2018 survey findings as discussed through this document. Previous survey efforts were driven by a historic redline boundary and additionally influenced by land access restrictions; therefore, gaps are present within initial survey results used to inform this document. These gaps have been included within the current and future survey schedule to ensure a 'complete' baseline of relevant ecological information is obtained to inform the EIA. This will not be a limitation to the EIA.

10.8.4. Where full ecological baseline information cannot be obtained due to access restrictions, a precautionary principle will be applied to any assessment of Important Ecological Features. The precautionary principle will assume a 'worst case' scenario utilising professional experience, and any field-based evidence (where available) of any feature/receptor unable to be accessed or sufficiently surveyed. Thereafter, the scenario will be assessed in the same manner as those features able to be accessed/surveyed.

10.8.5. By utilising the above approach this will ensure that appropriate mitigation/recommendations are provided even though these may not ultimately be required and can be amended accordingly should access/survey be possible at a later point.

11 ROAD DRAINAGE AND THE WATER ENVIRONMENT

11.1 INTRODUCTION

11.1.1. This Chapter considers the implications of the Scheme on the water environment during the construction and operational phases and any potential significant effects. It sets out the proposed methodology for the road drainage and the water environment assessment and identifies those impacts that can be scoped out of the EIA. It considers the main area of the Scheme, the compound at Lionheart Enterprise Park and the shared compound at West Thirston.

11.1.2. This Chapter has been informed by the results of the Options Selection Stage assessment and the methodology set out in DMRB Volume 11, Section 3, Part 10 (HD45/09).

11.1.3. This Chapter should be read together with the introductory chapters of this Scoping Report (**Chapters 1 - 5**) as well as **Chapter 16 – Assessment of Cumulative Effects**.

11.2 STUDY AREA

11.2.1. The study area will encompass surface water features up to 0.5 km from the Scheme. This distance is considered appropriate for the assessment of direct effects (i.e. associated with overland migration of pollutants directly to surface features, pollutants conveyed in drainage systems, and works within a river channel).

11.2.2. Features that are in hydraulic connectivity with the Scheme will also be considered, including surface water abstractions and downstream watercourses. Based on the professional judgement and current knowledge of the area, features located up to a distance of 1 km from the Scheme will be considered. This distance is considered appropriate for the assessment of indirect effects, although if sensitive features located further than 1 km from the Scheme are identified to be at risk, these features will also be considered within the assessment.

11.2.3. The study area will encompass groundwater features up to 0.5 km of the Scheme and groundwater abstractions up to 1 km from the Scheme. This distance is considered appropriate for the assessment of surface-borne pollutants migrating to groundwater features, although if sensitive features located further than 1 km from the Scheme are identified to be at risk, these features will also be considered within the assessment.

11.3 BASELINE CONDITIONS

11.3.1. The following data sources have been consulted to inform the baseline review:

- Environment Agency's online Flood Map for Planning (**Ref. 11.1**);
- Environment Agency's online Flood Risk from Surface Water map (**Ref. 11.2**);
- Environment Agency's online Flood Risk from Reservoirs map (**Ref. 11.3**);
- Environment Agency's Catchment Data Explorer (**Ref. 11.4**);
- Environment Agency's Northumbria River Basin Management Plan (**Ref. 11.5**);
- Ordnance Survey (OS) mapping (**Ref. 11.6**);
- Multi-Agency Geographic Information for the Countryside (MAGIC) online mapping (**Ref. 11.7**);
- A1 in Northumberland Option Selection EAR (**Ref. 11.8**);
- NCC Level 1 Strategic Flood Risk Assessment (SFRA) (**Ref. 11.9**);
- British Geological Survey (BGS) Geology of Britain Viewer (**Ref. 11.10**);
- BGS Geoindex online database (**Ref. 11.11**); and
- Highways Agency (now England) Drainage Data Management System (HADDMS) (**Ref. 11.12**).

11.3.2. No baseline monitoring or surveys have been undertaken to inform the baseline conditions. Further information will be obtained to supplement and verify the baseline conditions during the course of the EIA. Refer to **Appendix A - Figure A9: Water Constraints Plan**.

SURFACE WATER FEATURES

Main Scheme area

11.3.3. Review of OS mapping (**Ref.11.6**) indicates that the Scheme alignment crosses or is located in close proximity to approximately 16 watercourses within 0.5 km. The majority of the watercourses flow in an approximate west to east direction, except the White House Burn which flows in a north-east to south-west direction. None of the watercourses identified within 0.5 km of the Scheme are classified as a main river. All of the watercourses are classified as ordinary watercourses under the jurisdiction of NCC as Lead Local Flood Authority (LLFA).

11.3.4. All watercourses within the study area form part of the Northumbria Rivers Basin District.

11.3.5. Ecological and chemical quality of a number of watercourses and tributaries within the study area are assessed by the Environment Agency in accordance with the objectives of the Water Framework Directive (WFD) (**Ref. 11.4**). **Table 21** shows the WFD classifications (as assessed in 2016) for the watercourses within the study area, or that receive flow from watercourses within the study area.

Table 21 Water Framework Directive classifications

Watercourse	Chemical	Ecological
Unnamed tributary of Kittycarter Burn	Good	Poor
Denwick Burn	Good	Poor
White House Burn	Good	Poor
Shipperton Burn	Good	Good
Charlton Burn	Good	Good

11.3.6. Aquatic ecology surveys are discussed in more detail in **Chapter 10 - Biodiversity**.

11.3.7. Review of OS mapping (**Ref 11.6**) indicates that there are approximately ten other surface water features (ponds) within 0.5 km of the Scheme. They have no known designations, and their quality and ecological value is currently unclear. This will be assessed further in the EIA. The surface water ponds are located within predominantly rural areas and have no known significant recreational value or value within the economy.

11.3.8. Review of OS mapping (**Ref 11.6**) indicates that there is an unnamed covered reservoir within 0.5 km of the Scheme. It is located approximately 0.1 km to the west of the existing A1 near Craggy Wood. Although the covered reservoir is not visible on satellite imagery, due to the spatial constraints around the site it is likely that the reservoir will be small in size. As a result, it is assumed that there is no risk associated with the potential failure of the reservoir to the Scheme.

11.3.9. Analysis of the existing highway drainage system indicates there are existing highway drains that discharge to local watercourses along the A1 and local access roads. Further information will be obtained during the EIA.

Main Compound

11.3.10. Review of OS mapping (**Ref 11.6**) indicates that the compound near West Thirston is located in close proximity to one watercourse; an unnamed tributary of the Thirston Burn which flows along the northern boundary of the compound and forms part of the Northumbria Rivers Basin District. The Thirston Burn discharges into the River Coquet approximately 4 km downstream of the compound. The River Coquet is designated as a main river and therefore under the jurisdiction of the Environment Agency. The River Coquet is also part of the River Coquet and Coquet Valley Woodlands SSSI.

11.3.11. Ecological and chemical quality of the unnamed tributary of the Thirston Burn are assessed by the Environment Agency in accordance with the objectives of the WFD (**Ref. 11.4**). Review of the Environment Agency's Catchment Data Explorer (2016 results) indicates the unnamed tributary forms part of the Longdike Burn WFD catchment and has an overall quality of 'moderate', with ecological quality asses as 'moderate' and chemical quality assessed as 'good' (**Ref. 11.4**).

11.3.12. Review of OS mapping (**Ref 11.6**) indicates that there is one other surface water feature located within 0.5 km of the Scheme. The surface water pond is located approximately 0.4 km to the south-east of the compound. There are no known designations, and the quality and ecological value is currently unclear. This will be

assessed further in the EIA. The surface water pond is located within predominantly rural area and has no known significant recreational value or value within the economy.

Lionheart Enterprise Park Compound

11.3.13. Review of OS mapping (**Ref 11.6**) indicates that the Lionheart Enterprise Park Compound is located in close proximity to two watercourses within 0.5 km; the Willow Burn to the north and the Cawledge Burn to the south. The watercourses flow in a south-west to north-east direction. The watercourses are classified as ordinary watercourses under the jurisdiction of NCC as LLFA.

11.3.14. All watercourses form part of the Northumbria Rivers Basin District.

11.3.15. Ecological and chemical quality of the Cawledge Burn are assessed by the Environment Agency in accordance with the objectives of the WFD. Review of the Environment Agency's Catchment Data Explorer (2016 results) indicates an overall quality of 'good', with both ecological and chemical quality assessed as 'good' (**Ref. 11.4**).

11.3.16. Review of OS mapping (**Ref 11.6**) indicates that there are no other surface water features located within 0.5 km of the Scheme.

GROUNDWATER FEATURES

Main Scheme area

11.3.17. Review of the BGS mapping (**Ref 11.10**) indicates that the Scheme is primarily underlain by bedrock geology of the Yoredale group comprising limestone argillaceaceous rocks and sandstone. Review of the Environment Agency's aquifer data (**Ref 11.7**) indicates that the bedrock geology is classified as Secondary A Aquifer, described as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. The area located approximately 1 km to the north-west and areas approximately 0.8 km to the west of the Scheme boundary are classified as Principal Aquifers. Principal Aquifers are described as layers of rock or drift deposits that have high intergranular and / or fracture permeability meaning they usually provide a high level of water storage. They may support water supply and / or river base flow on a strategic scale.

11.3.18. Review of the BGS mapping (**Ref 11.10**) indicates that superficial deposits are mostly till with small areas of glacial sand and gravel located to the north and south ends of the study area.

11.3.19. Review of the Environment Agency Aquifer data (**Ref 11.7**) indicates that the majority of the superficial deposits are classified as Secondary (Undifferentiated) Aquifer. Small sections of superficial deposits classified as Secondary A Aquifer are located in the northern and southern sections of the study area.

11.3.20. A high-level review of historic borehole scans (**Ref 11.11**) within the study area indicates groundwater depths of between one and five metres.

Main Compound

11.3.21. Review of the BGS mapping (**Ref 11.10**) indicates that the compound is primarily underlain by bedrock geology of the Stainmore Formation consisting of mudstone, siltstone and sandstone.

11.3.22. Review of the Environment Agency's aquifer data (**Ref 11.7**) indicates that the bedrock geology is classified as Secondary A Aquifer, described as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

11.3.23. Review of the BGS mapping (**Ref 11.10**) indicates that superficial deposits are Glaciofluvial deposits consisting of sand and gravel.

11.3.24. Review of the Environment Agency Aquifer data (**Ref 11.7**) indicates that the majority of the superficial deposits are classified as Secondary A Aquifer.

Lionheart Enterprise Park Compound

11.3.25. Review of the BGS mapping (**Ref 11.10**) indicates that the compound is primarily underlain by bedrock geology of the Alston Formation comprising limestone, sandstone, siltstone and mudstone. Review of the Environment Agency's aquifer data (**Ref 11.7**) indicates that the bedrock geology is classified as Secondary A Aquifer, described as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

11.3.26. Review of the BGS mapping (**Ref 11.10**) indicates that superficial deposits underlying the compound consist of Glaciofluvial deposits (Devensian) consisting of sand and gravel.

11.3.27. Review of the Environment Agency Aquifer data (**Ref 11.7**) indicates that the majority of the superficial deposits are classified as Secondary A Aquifer.

FLOODING

Main Scheme area

11.3.28. Review of the Environment Agency Flood Map for Planning (Rivers and Sea) (**Ref 11.1**) indicates that the majority of the Scheme alignment is located within the low-risk Flood Zone 1 where the risk of flooding from fluvial sources is less than 1 in 1000 (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 to the east of Shipperton Bridge, where the risk of flooding from fluvial sources is greater than 1 in 100 in any year. The identified fluvial flood risks are associated with the following watercourses:

- The Denwick Burn which discharges into the River Aln to the south; and
- The Shipperton Burn which eventually discharges into the Long Nanny.

11.3.29. The NCC Level 1 SFRA (**Ref 11.9**) indicates significant flooding within the North-East Northumberland river catchments from fluvial and pluvial sources since 1744. A number of significant flood events are attributed to the River Aln which is located downstream of the study area.

11.3.30. Review of the Environment Agency Flood Risk from Surface Water map (**Ref 11.2**) indicates that sections of the Scheme are at high, medium and low risk of flooding from surface water sources. Flooding from surface water is typically associated with natural overland flow paths and local depressions in topography where surface water runoff can accumulate during or following heavy rainfall events. The Flood Risk from Surface Water map (**Ref 11.2**) can also indicate fluvial flood risk from watercourses with a catchment of less than 3 km^2 that are too small to be mapped on the Environment Agency Flood Map for Planning.

11.3.31. Review of the Highways England HADDMS (**Ref 11.12**) indicates that there are no historical high severity flood events recorded within the Scheme alignment.

11.3.32. Review of the Environment Agency Flood Risk from Reservoirs map (**Ref 11.3**) indicates that the Scheme is not at risk of flooding from potential failure of reservoirs located upstream of the study area.

Main Compound

11.3.33. Review of the Environment Agency Flood Map for Planning (Rivers and Sea) (**Ref 11.1**) indicates that the compound is located within the low-risk Flood Zone 1 where the risk of flooding from fluvial sources is less than 1 in 1000 (0.1%) in any year.

11.3.34. Review of the Environment Agency Flood Risk from Surface Water map (**Ref 11.2**) indicates that the compound is at low risk of flooding from surface water sources.

Lionheart Enterprise Park Compound

11.3.35. Review of the Environment Agency Flood Map for Planning (Rivers and Sea) (**Ref 11.1**) indicates that the compound area is located within the low-risk Flood Zone 1 where the risk of flooding from fluvial sources is less than 1 in 1000 (0.1%) in any year. There is a small area of the study area located in the high-risk Flood Zone 3 where the risk of flooding from fluvial sources is greater than 1 in 100 in any year. The identified fluvial flood risk is confined to the land immediately adjacent to and is associated with the Cawledge Burn.

11.3.36. Review of the Environment Agency Flood Risk from Surface Water map (**Ref 11.2**) indicates that the compound is at low risk of flooding from surface water sources. The land immediately adjacent to the Cawledge Burn is at a medium risk of surface water flooding.

IMPORTANCE OF BASELINE RECEPTORS

11.3.37. The importance of the identified surface water and groundwater features will be determined following a more detailed review of available information and in consultation with the relevant authorities (i.e. Environment Agency and NCC). An initial review of the importance of identified features is provided below in **Table 22** is based on Table A4.3 of Annex IV of Volume 11, Section 3, Part 10 of the DMRB (HD 45/09), as set out in the Methodology section below. The attributes of each receptor have been taken into consideration in the overall assignment of the importance value.

Table 22 Importance of baseline receptors

Receptors	Description	Value
Watercourses	Watercourses within the study area include ordinary watercourses with no known designations, recreational value or value to the economy. A number of watercourses within the study area are monitored against the objectives of the WFD and form part of wider catchments assessed to have good ecological quality. The River Coquet is located approximately 4 km downstream of the Thirston Burn,	Medium to Very High
Ponds	They have no known designations, and the use, quality and ecological value of these features is currently unclear. The ponds are located within predominantly rural areas and have no known significant recreational value or value to the economy.	Low
Groundwater resources	The scheme alignment is underlain by Secondary A Aquifer and is not located within a SPZ. There are areas designated as Principal Aquifer within 1 km of the study area.	Medium to High
Flood risk receptors	The proposed highway	Very High
	Residential receptors	High
	Agricultural land	Medium

11.4 POTENTIAL IMPACTS

CONSTRUCTION

11.4.1. During construction, it is considered likely that significant effects to surface water features, groundwater features and flood risk could arise from:

- Increased pollution risks from spillage of fuels or other harmful substances that may migrate to local surface water and groundwater receptors;
- Increased sedimentation within watercourses caused by surface water runoff from areas of bare earth, construction materials such as aggregate and stockpiles of topsoil;
- Impacts to the hydromorphological, chemical and ecological quality of watercourses associated with works within or in close proximity to watercourses such as the installation and alteration of culverts, bridges and outfalls as well as realignment of watercourses, including longer-term changes associated with sediment deposition; and
- Increased flood risk associated with temporary works within areas of fluvial flood storage, works to existing watercourse alignments and culverts, and associated with changes to catchment permeability and hydrology.

OPERATION

11.4.2. During operation, it is considered likely that significant effects to surface water features, groundwater features and flood risk could arise from:

- Polluted surface water runoff containing silts and hydrocarbons that may migrate or be discharged to surface water features or groundwater resources via the proposed highway drainage system;
- Permanent impact to the hydromorphological and ecological quality of water features associated with works within or in close proximity to water features such as the installation and alteration of culverts, bridges and outfalls as well as realignment of watercourses;
- Permanent impacts to catchment hydrology causing changes to natural catchment dynamics associated with the proposed highway drainage system and proposed watercourse diversions;
- Increased rates and volumes of surface water runoff from an increase in impermeable area or changes to the existing drainage regime leading to a potential increase in flood risk; and

- Increased flood risk to the scheme and to people and property elsewhere caused by displacement of flood water storage or crossing of watercourses thus impacting flood flow conveyance.

11.5 DESIGN, MITIGATION AND ENHANCEMENT MEASURES

CONSTRUCTION

11.5.1. A CEMP will be prepared for the works that will include method statements for the proposed works, details of materials to be used, and an emergency response plan. The CEMP will contain measures to protect both surface and groundwater quality, and other water resource aspects.

11.5.2. During the construction phase, consideration will be given to potential impacts to catchment hydrology and flow within existing watercourses. Temporary diversions of watercourses may need to be established prior to undertaking the works to maintain existing catchments and flow regimes. Temporary drainage systems may also be required to capture, manage and attenuate flow prior to discharge to prevent increased flood risk.

OPERATION

11.5.3. To mitigate potential impacts during the operational phase, a robust surface water drainage system will be provided to ensure discharge from the Scheme does not increase flood risk elsewhere up to and including the 1 in 100 (1%) annual probability rainfall event, allowing for climate change effects. As online improvements are proposed, consideration must also be given to the ability of the existing drainage systems to receive any additional flows. The Scheme may offer an opportunity for betterment, for example if attenuation can be introduced in areas where attenuation is currently not provided prior to discharge.

11.5.4. Isolated sections of the Scheme are identified to be at risk of surface water flooding due to natural depressions in topography and overland flow paths, typically associated with the watercourses that are crossed by the Scheme. In order to protect the Scheme, consideration will be given to maintaining these overland flow paths and localised raising of ground levels to mitigate the potential impact of surface water flooding on the highway and to its users. The works also present an opportunity to reduce existing surface water flood risk to the highway alignment through enhancement of the existing drainage system.

11.5.5. Any widening of existing highway culverts and bridge crossings and any watercourse diversions will maintain hydraulic capacity and, where possible, explore opportunities to provide betterment. Any new crossings of watercourses and any new watercourse channels will maintain the capacity of the channel, ensure no increased flood risk up to the 1 in 100-year event considering the potential effects of climate change, be designed in accordance with the DMRB (HD45/09), and be sensitive to ecological requirements.

11.5.6. Surface water runoff is likely to contain high levels of sediment and hydrocarbons that can pollute surface water and groundwater features through direct migration or via the surface water drainage system. A robust treatment system will therefore be required. Existing drainage arrangements and water treatment provision is currently being investigated. The works may provide an opportunity to provide betterment. Multi-stage proposals that maximise passive treatment through the use of Sustainable Drainage Systems (SUDS) will be considered.

11.5.7. Small areas of the study area are located within the high-risk Flood Zone 3. Any loss of fluvial flood storage will be compensated on a like-for-like basis to ensure no increased risk of flooding to the Scheme or elsewhere up to the 1 in 100-year event considering the potential effects of climate change.

11.6 DESCRIPTION OF THE LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION

11.6.1. During construction, it is considered likely that significant effects to surface water features, groundwater features and flood risk could arise from:

- Increased pollution risks – It is considered likely that any impacts will be direct and temporary.
- Increased sedimentation – It is considered likely that any impacts will be direct and temporary.
- Impacts to the hydromorphological, chemical and ecological quality of watercourses – It is considered likely that any impacts will be direct and temporary.
- Increased flood risk – It is considered likely that any impacts will be direct and temporary.

OPERATION

11.6.2. During operation, it is considered likely that significant effects to surface water features, groundwater features and flood risk could arise from:

- Polluted surface water runoff – It is considered likely that any direct impacts will be long-term.
- Permanent impact to the hydromorphological and ecological quality of water features – It is considered likely that any direct impacts will be long-term.
- Permanent impacts to catchment hydrology – It is considered likely that any direct impacts will be long-term.
- Increased rates and volumes of surface water runoff – It is considered likely that any direct impacts will be long-term.
- Increased flood risk – It is considered likely that any direct impacts will be long-term.

11.7 ASSESSMENT METHODOLOGY

TOPICS AND ELEMENTS OF TOPICS TO BE SCOPED OUT

11.7.1. Surface water features and groundwater features that are located outside of the 0.5 km study area and are considered to not be hydraulically connected to the Scheme will not be considered in the assessment and are therefore scoped out.

11.7.2. Potential impacts to groundwater associated with impacts to groundwater quantity, groundwater flows and the release of contaminants contained in the ground will be assessed in **Chapter 12 - Geology and Soils** of this Scoping Report. Similarly, impacts to ecology, including sensitive and / or important aquatic species and habitats, will be assessed in **Chapter 10 – Biodiversity** of this Scoping Report.

11.7.3. All surface water features and groundwater features identified within the baseline condition section are scoped in to the EIA. The aspects of the water environment that will be considered within this section include the ecological, chemical and hydromorphological quality of surface water features, flood risk and groundwater quality in so far that groundwater may be affected by surface-borne pollutants for both the construction and operation phases.

LEGISLATION, POLICY AND GUIDANCE

11.7.4. Legislation relevant to the Scheme will be presented in the ES and will consist of the following aspects:

- European Policy;
- National Policy; and
- Local Planning Policy.

11.7.5. The following legislation will underpin the assessment and will be described in detail in the assessment:

- Water Framework Directive (2000/60/EC);
- Groundwater Directive (2006/118/EC);
- NPPF (2018);
- Flood and Water Management Act (2010);
- Environmental Permitting (England and Wales) Regulations (2010); and
- Land Drainage Act (1991).

11.7.6. The following policy and guidance will underpin the assessment and will be described in detail in the assessment:

- Non-Statutory Technical Standards for Sustainable Drainage Systems (2015);
- Alnwick District Local Development Framework;
- Northumberland Local Flood Risk Management Strategy;
- Environment Agency Groundwater Protection Guides;
- Pollution Prevention Guidelines; and
- DMRB.

11.7.7. Policy and plans relevant to the Scheme will be presented at Preliminary Design Stage which will form part of the ES and will consist of the following aspects:

- A schedule of the relevant national, regional, county and local policies; and

- A commentary setting out the significance of the impact of the Scheme on each policy objective.

METHODOLOGY

11.7.8. The assessment will be undertaken in accordance with the DMRB Volume 11, Section 3, Part 10 (HD 45/09) and will involve a desk-based review of existing information, a site visit and assessment of the Scheme effects in relation to flood risk and the quality of surface water and groundwater features.

Human Health

11.7.9. The methodology for the assessment of effects on human health associated with road drainage and the water environment takes the form of a risk assessment approach of the following, as set out in DMRB (HD 45/09):

- Pollution on human health via impacts to groundwater supplies of drinking water; and
- Flood risk, whether to the scheme or to other areas, as a result of the Scheme.

11.7.10. The potential effects of the Scheme on human health are reported within **Chapter 13 - Population and Health**.

ASSESSMENT CRITERIA

CONSTRUCTION

11.7.11. A **Simple Level** assessment (as defined in Chapter 6 of DMRB Vol 11, Section 3, Part 10 HD45/09) of potential effects that may arise during construction will be a qualitative assessment that considers risks to the chemical quality of surface water and groundwater features associated with pollutants typically experienced during construction.

11.7.12. Changes in flood risk during the construction phase will be assessed qualitatively based on professional judgement and any necessary mitigation proposed. The assessment will also consider the anticipated temporary drainage solution which will be implemented during the construction phase of the Scheme.

OPERATION

11.7.13. The assessment of potential effects to the water quality that may arise during operation will be informed by the HAWRAT methods outlined in HD 45/09 (namely Methods A, B, C and D) to assess potential effects to surface water and groundwater quality, including risks associated with spillage.

11.7.14. Method A will be used to undertake a **Simple Level** assessment (as defined in Chapter 6 of DMRB Vol 11, Section 3, Part 10 HD45/09) of the potential impact of routine runoff on the chemical quality of receiving surface waters. This will indicate if there is likely to be a risk of pollution that should be explored further or if the risks can be considered sufficiently low not to warrant any further investigation. If further assessment is required, Method B can be used to undertake a **Detailed Level** (as defined in Chapter 6 of DMRB Vol 11, Section 3, Part 10 HD45/09) assessment of the potential impact. It is considered unlikely that sampling of baseline water quality will be required to inform the assessment and that, if necessary, catchment descriptors from similar rural and upstream catchments can be used.

11.7.15. Method C will be used to assess the risk of pollution impacts from routine runoff on groundwater quality and is based on an assessment of the source-pathway-receptor protocol used in risk assessment procedures. This will be undertaken if soakaway drainage or unlined drainage channels are proposed.

11.7.16. Method D will be used to determine the potential impacts from accidental spillages predominantly due to road collisions involving the spillage of a potentially polluting substance somewhere on the length of the Scheme. It calculates the risk, assuming a spillage has occurred, that the pollutant will reach and impact on the receiving watercourse. This method considers local collision data, existing incident response arrangement and the vulnerability of receiving water bodies.

11.7.17. In addition to the core aspects of assessment as defined within DMRB (HD 45/09), the assessment of potential impacts to the water environment will also consider potential impacts to the hydromorphological quality of surface water features for both temporary and permanent works. This is likely to be associated with the introduction of new structures such as culverts and bridges, potential realignment of existing watercourses, and potential changes to watercourse hydrology associated with the introduction of a linear barrier or diversion of natural flow caused by the proposed surface water drainage system or cuttings that could affect baseflow to rivers. The findings of this assessment will also contribute to the assessment of potential ecological effects assessed within **Chapter 10 – Biodiversity** of this Scoping Report. It is proposed that this assessment is qualitative and informed by desk-based study, site walkover and consultation with the Scheme ecologist.

FLOOD RISK ASSESSMENT

11.7.18. A standalone Flood Risk Assessment (FRA) will be prepared to support the EIA in accordance with the NPPF (2018), Planning Practice Guidance (PPG) and the NPS NN (December 2014), and will be reported within the ES. Paragraphs 5.92 to 5.97 of the NPS NN provide guidance on flood risk assessment for NSIPs and will be used to inform the preparation of the FRA. The FRA will assess the potential implications of the Scheme on flood risk to people and property, as well as assess the potential risk of flooding to the Scheme. It is proposed that the following aspects will be considered:

- Potential impacts to flood flow conveyance in watercourses crossed by the Scheme associated with the construction of new culverts, bridges and embankments and diversion of watercourses;
- Potential impacts to the Scheme from all sources of flooding, including fluvial, surface water, groundwater, drainage systems and artificial sources; and
- Potential impacts to fluvial and surface water flooding associated with an increase in impermeable surfacing and / or changes to catchment hydrology associated with the proposed surface water drainage system.

11.7.19. Hydraulic modelling is proposed to inform the FRA for the most significant watercourses likely to be affected by the Scheme. At this stage, it is considered likely that hydraulic modelling will be undertaken to inform the assessment of risk and mitigation for the unnamed Tributary of Kittycarter Burn, Shipperton Burn and Denwick Burn. Further modelling may also need to be undertaken if catchments are to be altered and the surface water regime changed. The need for hydraulic modelling will be discussed and agreed with the Environment Agency and NCC once further information is available on the design of potential crossings / culverts and catchments for surface water have been determined. Model output data will include detailed and calibrated hydraulic model flood extent outlines for the 20, 100, 100 plus climate change and 1000 year return period events for the operation phase, and the construction phase in line with further consultation with the Environment Agency once the construction methodology is available.

11.7.20. It is proposed that a simplified approach is taken to inform the assessment of risk and mitigation for other watercourses affected by the Scheme, using hand calculations or software such as Culvert Master to inform the appropriate sizing and design of proposed diversions and watercourse crossings.

11.7.21. All assessments will take into account the potential effects of climate change. For watercourses with a catchment of greater than 3 km², it is proposed to use the Higher Central allowance for the increase in peak flow to inform the design on the works and test the resilience of the design against the Upper-End allowance. For watercourses with a catchment of less than 3 km², it is proposed to use the peak rainfall intensity guidance, using the Central allowance to inform the design on the works, and the Upper-End allowance to test the resilience of the design. The level of assessment and assessment approach will be confirmed in line with consultation with the Environment Agency and NCC.

WATER FRAMEWORK DIRECTIVE

11.7.22. A **Simple Level** (as defined in Chapter 6 of DMRB Vol 11, Section 3, Part 10 HD45/09) assessment of the potential works against the objectives of the WFD will also be undertaken. A standalone WFD assessment will be prepared and the findings presented within the ES.

SIGNIFICANCE CRITERIA

11.7.23. In order to assess the significance of effects from the Scheme on the water environment, the guidelines within Annex IV of Volume 11, Section 3, Part 10 of the DMRB (HD 45/09) will be followed. This promotes the following approach:

- Estimation of the importance of the attribute;
- Estimation of the magnitude of the impact; and
- Assessment of the significance of the impact based on the importance of the attribute and magnitude of the impact.

11.7.24. The importance (Very High, High, Medium, or Low) of the receptors will be described using the criteria and typical examples as outlined in Table A4.3 of the guidance.

11.7.25. The magnitude (Major adverse, Moderate adverse, Minor adverse, Negligible, Minor beneficial, Moderate beneficial, Major beneficial) of the predicted effect on the receptors will be described using the criteria and examples as outlined in Table A4.4 of the guidance.

11.7.26. The identification of significant effects will align to the matrix in Table A4.5 of the guidance. Where an effect is considered not to be significant or have no influence, irrespective of other effects, it will be classified as neutral.

11.8 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

11.8.1. This Scoping Report is based on currently available information, and can be subject to change as the design progresses. This is of particular importance when considering potential impacts associated with the quality of surface water runoff, hydromorphology and channel hydraulics, and flood risk.

11.8.2. It is assumed that further drainage information will become available later on at this Preliminary Design Stage through further investigation and consultation. This will be essential to the detailed assessment of risks associated with water quality and increased flood risk.

11.8.3. As of the time of writing this Scoping Report, valid traffic data is not available.

12 GEOLOGY AND SOILS

12.1 INTRODUCTION

12.1.1. This Chapter considers the implications of the Scheme on geology and soils during the construction and operational phases and any potential significant effects. It sets out the proposed methodology for geology and soils and identifies those impacts that can be scoped out of the EIA.

12.1.2. This Chapter has been informed by the results of the Preliminary Sources Studies Report (PSSR) (**Ref 12.1** (Alnwick to Ellingham) and **Ref 12.14** Morpeth to Felton), the Options Selection Stage EAR (**Ref 12.2**) and the methodology set out in DMRB Volume 11, Section 3, Part 6 Land Use (**Ref 12.3**) and DMRB Volume 11, Section 3, Part 11 Geology and Soils (**Ref 12.4**).

12.1.3. This Chapter should be read together with the introductory chapters of this Report (**Chapters 1 - 5**) as well as **Chapter 16 – Assessment of Cumulative Effects**.

12.2 STUDY AREA

12.2.1. The study area for the geology and soils chapter will incorporate the Scheme plus a buffer of 250 m beyond the redline boundary. It is considered that this is the only area that would be affected in terms of geology and soils based on potential sources of contamination and the sensitivity of environmental receptors.

12.3 BASELINE CONDITIONS

12.3.1. The following data sources have been consulted to inform the baseline review:

- A1 in Northumberland: Alnwick to Ellingham PSSR HAGDMS No. 29384(**Ref. 12.1**);
- A1 in Northumberland: Option Selection EAR (**Ref. 12.2**).
- The Shadbolt Group, Preliminary Risk Assessment (**Ref. 12.5**).
- Agricultural Land Classification (ALC) 1:250,000 scale series provisional map for North East Region (**Ref 12.6**);
- Natural England's National Character Area (NCA) profile, No. 14 Tyne, and Wear Lowlands (**Ref 12.7**);
- Cranfield Soil and Agrifood Institute Soilscapes database (**Ref 12.8**);
- Natural England Magic Database (**Ref 12.9**); and
- British Geological Survey (BGS) Minerals UK Onshore Mineral Resource Maps Northumberland Tyne and Wear (**Ref 12.10**).

12.3.2. At the time of writing this chapter there is no recent ground investigation data available. Ground investigation works are proposed to be completed in 2018, additional information obtained will be used to inform the ES.

GEOLOGY

12.3.3. The study area lies within a predominantly agricultural area and the surface ground conditions are anticipated to comprise topsoil and subsoil of varying depths and properties outside of developed areas, beneath the existing carriageway and developed areas made ground is anticipated to be present. Natural superficial deposits comprising glacial till, glaciofluvial and glaciolacustrine deposits are shown to underlie the length of the study area and bedrock is shown to comprise sedimentary strata of Lower Carboniferous age. Further details of the underlying geology are provided below.

Topsoil and Subsoil

12.3.4. With reference to the Cranfield Soil and Agrifood Institute Soilscapes database (**Ref 12.8**), **Table 23** summarises the soil properties within the study area.

Table 23 Soil properties within the study area

	Southern extent of Scheme Footprint to Rock Nab	Rock Nab to northern extent of Scheme Footprint	Study area to west of West Linkhall Access Track	Main Compound	Lionheart Industrial Estate Compound
Soil Description	Soilscape 17: Slowly permeable seasonally wet acid loamy and clayey soils.	Soilscape 6: Freely draining slightly acid loamy soils	Soilscape 18: Slowly permeable seasonally wet slightly acidic but base-rich loamy and clayey soils	Soilscape 18: Slowly permeable seasonally wet slightly acidic but base-rich loamy and clayey soils	Soilscape 6: Freely draining slightly acid loamy soils
Texture	Loamy and clayey	Loamy	Loamy and clayey	Loamy and clayey	Loamy
Drainage	Impeded drainage	Freely draining	Impeded drainage	Impeded drainage	Freely draining
Fertility	Low	Low	Moderate	Moderate	Low
Habitats	Seasonally wet pastures and woodlands	Neutral and acid pastures and deciduous woodlands: acid communities such as bracken and gorse in the uplands	Seasonally wet pastures and woodlands	Seasonally wet pastures and woodlands	Neutral and acid pastures and deciduous woodlands: acid communities such as bracken and gorse in the uplands
Landcover	Grassland with some arable and forestry	Arable and grassland	Grassland and arable some woodland	Grassland and arable some woodland	Arable and grassland
Carbon	Medium	Low	Low	Low	Low
Water Protection	Main risks are associated with overland flow from compacted or poached fields. Organic slurry, dirty water, fertiliser, pathogens and fine sediment can all move in suspension or solution with overland flow or drain water.	Groundwater contamination with nitrate; siltation and nutrient enrichment of streams from soil erosion is certain from these soils.	Main risks are associated with overland flow from compacted or poached fields. Organic slurry, dirty water, fertiliser, pathogens and fine sediment can all move in suspension or solution with overland flow or drain water.	Main risks are associated with overland flow from compacted or poached fields. Organic slurry, dirty water, fertiliser, pathogens and fine sediment can all move in suspension or solution with overland flow or drain water.	Groundwater contamination with nitrate; siltation and nutrient enrichment of streams from soil erosion is certain from these soils.

Made Ground

Main Scheme Area and Lionheart Enterprise Park Compound

12.3.5. BGS maps do not show the presence of made ground within the study area however made ground is anticipated to be present in developed areas such as beneath the existing carriageway and farmsteads. The PSSR (Ref. 12.1) refers to historical ponds and quarries within the area which are no longer present, these may represent localised areas of made ground as a result of historical infilling with soil or waste material or may have been infilled as a result of natural processes such as sedimentation over time.

12.3.6. Available BGS historical records for the study area do not record the presence of made ground.

Main Compound

12.3.7. BGS maps do not show the presence of made ground within the study area, given the current agricultural use shallow ground conditions are anticipated to comprise topsoil.

12.3.8. Available BGS historical records for the study area record topsoil (possible made ground) to a depth of 0.3 mbgl.

Superficial Deposits

Main Scheme Area

12.3.9. Superficial deposits are shown on BGS maps to be present beneath the majority of the study area. With the exception of a localised area in the vicinity of Heckley House and Heckley Fence, to the east of South Chorlton Bog and to the north of East Linkhall.

12.3.10. The southern section of the study area, between Alnwick and Rock Nab is shown to be predominantly underlain by Glacial Till. The most southern extent of the study area is shown to be underlain by Alluvium and there are also small pockets of Alluvium shown in the vicinity of Rock Nab and along the access track to Rock South Farm. A localised area of peat, associated with 'South Chorlton Bog', is shown to be present beneath the existing carriageway to the east of South Charlton Bog.

12.3.11. The northern section of the study area, between Rock Nab and North Chorlton is shown to be predominantly underlain by Glaciofluvial deposits comprising sands and gravels. Small localised areas of Alluvium are also shown to be present in the northern section of the study area.

Lionheart Enterprise Park Compound

12.3.12. The compound area to the south of Alnwick is shown to be predominantly underlain by Glacial Till.

Main Compound

12.3.13. The compound near West Thirston is shown to be predominantly underlain by Glacial Till.

Bedrock Geology

Main Scheme Area and Lionheart Enterprise Park Compound

12.3.14. The BGS maps show the underlying bedrock to comprise sedimentary strata of Lower Carboniferous age comprising marine deposits of the Alston Formation, Tyne Limestone Formation and the Scremerston Coal Member. These consist of a succession of limestone, mudstone, siltstone and sandstone with occasional coal seams within the Scremerston Coal Member.

Main Compound

12.3.15. The BGS maps show the underlying bedrock to comprise sedimentary strata of Carboniferous age comprising the Yordale Group, consisting of limestone, sandstone and mudstone.

MINING

Main Scheme Area and Lionheart Enterprise Park Compound

12.3.16. The study area is not affected by recorded underground or opencast mining, nor are there future mining operations planned. However, the route is underlain by coal seams; although these have no record of being mined, the possibility that there are mine workings within these seams cannot be ruled out.

Main Compound

12.3.17. The study area lies within a Coal Authority Coal Mining Reporting Area, but not within a Development High Risk Area.

MINERAL RESOURCES

12.3.18. Minerals UK Onshore Mineral Resource Maps Northumberland Tyne and Wear (Ref 12.10) indicates that there are potential mineral resources present within the study area comprising river sand and gravels, glacial sand and gravels, peat and coal.

HYDROGEOLOGY

Main Scheme Area and Lionheart Enterprise Park Compound

12.3.19. The underlying glaciofluvial deposits are classified by the Environment Agency as a Secondary A Aquifer, and the Glacial Till as a Secondary Aquifer (undifferentiated). The areas of peat and alluvium are classed as unproductive strata. The underlying bedrock is classified as a Secondary A Aquifer.

12.3.20. According to the Natural England Magic Database (Ref 12.9) the site is not within a Groundwater Source Protection Zone (SPZ), nor is one present within 250 m of the site There are no licensed groundwater abstraction points within the study area.

Main Compound

12.3.21. The underlying Glacial Till is classified by the Environment Agency as a Secondary A Aquifer (undifferentiated). The underlying bedrock is classified as a Secondary A Aquifer.

12.3.22. According to the Natural England Magic Database (Ref 12.9) the site is not within a Groundwater Source Protection Zone (SPZ), nor is one present within 250 m of the site There are no licensed groundwater abstraction points within the study area.

HYDROLOGY

12.3.23. A summary of the surface water features identified within the study area together with their WFD classification is provided in **Table 24**.

Table 24 Surface water features within the study area

Name	Chemical	Ecological
Main Scheme Area		
Unnamed tributary of Kittycarter Burn	Good	Poor
Denwick Burn	Good	Poor
White House Burn	Good	Poor
Shipperton Burn	Good	Good
Charlton Burn	Good	Good
Main Compound		
Unnamed tributary of Thirston Burn	Good	Moderate
Lionheart Enterprise Park Compound		
Willow Burn	-	-
Cawledge Burn	Good	Good

12.3.24. There are no main rivers within the study area.

UNEXPLODED ORDNANCE

Main Scheme Area and Lionheart Enterprise Park Compound

12.3.25. The PSSR (**Ref 12.1**) 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.

The PDSA suggests that the completion of further detailed investigation is likely to confirm a low risk of Unexploded Ordnance (UXO). The outcome of this investigation will inform future requirements for further work.

Main Compound

12.3.26. A detailed desk study assessment was undertaken for the A1 in Northumberland: Morpeth to Felton scheme (Ref 12.14). A strategic target was located within the study area; Eshott Airfield. The UXO hazard plan provided within the Zetica report presents the A1 in Northumberland: Morpeth to Felton scheme area as a low risk with respect to UXO.

DESIGNATED SITES

12.3.27. There are no Geological Sites of importance within the study area and there are no Local Geological Sites within the study area. NCC have been contacted to confirm the absence of Regionally Important Geological or Geomorphological Sites (RIGS) are located within the study area.

AGRICULTURAL LAND CLASSIFICATION

12.3.28. Agricultural land has been classified by Defra, by grade according to the extent to which chemical and physical characteristics impose long term limitations on agricultural use for food production. In accordance with the DMRB guidance Volume 11, Section 3 Part 6, only land potentially falling within Agricultural Land Classification (ALC) grades 1, 2 and 3a, are considered to be Best and Most Versatile (BMV) land. BMV land is best suited to adapting to the changing needs of agriculture and maintaining the competitiveness of UK agriculture against international competitors.

12.3.29. The ALC provisional map for the North-East Region (**Ref 12.4**) shows the study area to lie within an area with a Grade 3 (Good to Moderate) ALC. The ALC map does not show subdivisions of Grade 3, which can be mapped by more detailed survey work.

12.3.30. It is anticipated that there will be some temporary and permanent agricultural land take required to accommodate the Scheme, particularly for provision of proposed drainage ponds, construction compounds and temporary works. At this stage it is not known how much land is required for permanent works.

WASTE DISPOSAL

Main Scheme Area

12.3.31. There are no active or historical landfills or waste transfer stations within 250 m of the Scheme.

Lionheart Enterprise Park Compound

12.3.32. A historical landfill site, East Cawledge, is shown 186 m to the north of the proposed compound. Records show that the historical landfill was first recorded in 1927 and last recorded in 1972, there are no details relating to the waste types deposited.

Main Compound

12.3.33. There are no active or historical landfills within 250 m of the compound near West Thirston.

POTENTIAL SOURCES OF CONTAMINATION

12.3.34. Based on a review of publicly available desk based information and the information provided within the PSSR the following potential sources of contamination within the study area have been identified:

- Made ground associated within construction of the existing carriageway;
- Made ground or fill material associated with historical small quarries and ponds;
- Fuel storage tanks within farmsteads located within the study area;
- Historical tramway crossing the Lionheart Industrial Estate Compound;
- Storage of agricultural chemicals within farmsteads located within the study area;
- Agricultural run-off (nitrates, ammonium, organics, sediments);
- WW2 airfield adjacent to the Compound near West Thirston; and
- Run-off and potential fuel / oil spillages from vehicles using the existing carriageway.

POTENTIAL CONTAMINANT PATHWAYS

12.3.35. Potential contaminant pathways include:

Human Health

- Direct contact, soil ingestion and inhalation; and
- Migration and accumulation of ground gas and or vapours in excavations and inhalation / asphyxiation by site preparation, earthworks, construction and maintenance workers.

Controlled Waters

- Infiltration of rainwater and leaching of contamination to shallow perched water and or groundwater;
- Surface run-off of contaminants and sediments into surface water bodies (rivers, drains and ponds);
- Migration from groundwater into surface water bodies; and
- Lateral and vertical leaching of contaminants into underlying Secondary A Aquifer.

ENVIRONMENTAL RECEPTORS

12.3.36. Geology and soils related receptors that are likely to be considered within the EIA are summarised in **Table 25**. In the absence of specific guidance within the DMRB relating to the extent of the study area, for the purposes of this scoping report, these values are based upon guidance contained within R&D Publication 66: 2008 Volume 1 (**Ref 12.11**). The sensitivity criteria will be confirmed and reported in the ES.

Table 25 Environmental Receptors

Aspect	Sensitive Receptor	Sensitivity*
Human Health	Construction workers; Adjacent site users (visitors / workers); Future below ground maintenance workers; and Future site users.	Medium
Controlled Waters	Surface watercourses; and Groundwater (Secondary A Aquifers).	Medium
Soils	Loamy and clayey and loamy soils; Fertility of low to moderate; and ALC – Grade 3 (Good to Moderate).	Medium
* Assigned on the basis of professional judgement		

12.4 POTENTIAL IMPACTS

12.4.1. A summary of the potential impacts of the Scheme on Geology and Soils, without mitigation measures in place, is provided below.

CONSTRUCTION

- Loss of agricultural soil;
- Excavation of peat;
- Deterioration of soil quality via compaction and sealing;
- Impact to human health (construction workers and neighbours) caused by exposure to potentially contaminated ground;
- Impact to human health associated with potential ground instability; and
- Impact to shallow soils and controlled waters from the release of physical and chemical contaminants.

OPERATION

- Impact to shallow soils and controlled waters as a result of surface run-off from general operation of the carriageway;
- Impact to shallow soils and controlled waters as a result of fuel / oil leaks from vehicles using the carriageway (general operation);
- Impact to shallow soils and controlled waters from a significant release of physical and chemical contaminants as a result of an isolated incident such as an accident (e.g. fuel, oils, fire water, release of a potentially contaminative vehicle load);
- Impacts to human health caused by exposure to potential contamination exposed within landscaped areas of the Scheme (e.g. grass verges); and

- Impacts to human health (maintenance workers) caused by exposure to potential contamination within areas requiring groundworks during operation such as service trenches.

12.5 DESIGN, MITIGATION AND ENHANCEMENT MEASURES

12.5.1. The likely mitigation measures to be applied to the Scheme to avoid, prevent or reduce significant effects to geology and soils related environmental receptors, during both the construction and operational phase are outlined separately below.

CONSTRUCTION

- An ALC survey should be completed to inform the ES and assess the requirement for mitigation measures to be put in place during construction.
- Soil management operations to generally be in accordance with Defra's Good Practice Guide for Handling Soils;
- Implementation of a CEMP to mitigate risks associated with the construction phase. To include measures to:
  - Mitigate impacts to soil quality;
  - Mitigate physical and chemical surface water contamination;
  - Limit chemical spillages; and
  - Provide guidance of suitable health and safety practices.
- Earthworks to be completed in accordance with a CL:AIRE compliant Materials Management Plan (MMP) to ensure that re-used material does not present a risk to human health or the environment.
- Construction works to be completed in accordance with relevant guidance and best practice documents to limit environmental impact during construction.
- Ensuring construction workers wear appropriate Personal Protective Equipment (PPE) and use monitoring equipment where appropriate. The preparation of Risk Assessments and Method Statements (RAMS) will ensure the appropriate use of PPE such as Respiratory Protective Equipment (RPE) where required.
- The incorporation of a temporary drainage strategy during the construction phase to limit the uncontrolled run-off of chemical and physical contaminants.
- The preparation of RAMS to ensure mitigation measures such as temporary shoring is incorporated should there be a risk of loose or unstable ground.

OPERATION

- Pollution control measures to be incorporated within the Scheme drainage design.
- The completion of earthworks in accordance with a MMP to mitigate potential impacts to human health and controlled waters.
- Ongoing maintenance plan to ensure the Scheme drainage system is meeting its operational requirements.

12.6 DESCRIPTION OF THE LIKELY SIGNIFICANT EFFECTS

12.6.1. It is anticipated that permanent mitigation and environmental enhancement measures are to be incorporated into the design of the Scheme and temporary mitigation measures would be implemented during the construction phase.

CONSTRUCTION

12.6.2. During construction, potential significant effects to Geology and Soils could arise from:

- Physical loss of agricultural soil;
- Excavation of peat;
- Deterioration of soil quality via compaction and sealing;
- Impact to human health caused by exposure to potentially contaminated ground;
- Impact to human health associated with potential ground instability; and
- Increased pollution risks to shallow soils and controlled waters from the release of physical and chemical contaminants.

OPERATION

12.6.3. During operation, potential significant effects to Geology and Soils could arise from:

- Increased pollution risks associated with surface water from the carriageway containing fuel / oil leaks from vehicles;
- Increased pollution risks from a significant release of physical and chemical contaminants as a result of an isolated incident such as an accident; and
- Increased risk to human health caused by exposure to potential contamination exposed within landscaped areas of the and areas requiring groundworks during operation such as service trenches.

12.7 ASSESSMENT METHODOLOGY

TOPICS AND ELEMENTS OF TOPICS TO BE SCOPED IN AND OUT

12.7.1. The following elements have been **scoped out** of the EIA:

- The effect on statutory and non-statutory sites of geological importance, as no sites have been identified within the study area or surrounding area (confirmation from NCC, NCA14 (**Ref 12.7)** has not yet been received) states there are no Local Geological Sites within the study area.

12.7.2. The following elements have been **scoped in** to the EIA:

- Impacts on agricultural land;
- Impacts on soil quality;
- Impacts on potential mineral resources;
- Impacts associated with historical mining activities;
- Impacts associated with earthworks;
- Impacts associated with construction phase activities such as the establishment of temporary construction compounds, use and maintenance of heavy machinery, fuel / oil and chemical storage, potential spills and stockpiling of materials;
- Impacts associated with the potential for encountering potentially contaminated made ground; and
- Impacts associated with the operational phase of the Scheme such as surface water run-off (containing both chemical and physical contaminants) and potential for isolated significant release of chemical and physical contaminants.

LEGISLATION, POLICY AND GUIDANCE

12.7.3. Legislation relevant to the Scheme will be presented in the ES and will consist of the following aspects:

- European Policy;
- National Policy; and
- Local Planning Policy.

12.7.4. The following legislation will underpin the assessment and will be described in detail in the assessment:

- Part 2A of the Environmental Protection Act, 1990;
- Environment Act, 1995;
- Control of Substances Hazardous to Human Health Regulations, 2002 (as amended);
- The Water Environment (Water Framework Directive) (England and Wales) Regulations, 2003 (2000/60/EC);
- Dangerous Substances Directive (Amendment), 2006 controls the amount of dangerous substances that are discharged into inland, coastal and territorial waters;
- Environmental Damage and Liability (Prevention and Remediation) Regulations, 2009;
- The Environmental Permitting (England and Wales) Regulations, 2010;
- Control of Asbestos Regulations, 2012;
- Contaminated Land (England) (Amendment) Regulations, 2012; and
- Construction (Design & Management) (CDM) Regulations, 2015.

12.7.5. The following policy and guidance will underpin the assessment and will be described in detail in the assessment:

- NPPF, 2018.

12.7.6. Policy and plans relevant to the Scheme will be presented at Preliminary Design Stage which will form part of the ES and will consist of the following aspects:

- A schedule of the relevant national, regional, county and local policies; and

- A commentary setting out the significance of the impact of the Scheme on each policy objective.

METHODOLOGY

12.7.7. A **Detailed Level** of assessment will be undertaken as defined by DMRB Volume 11, Section 3 Part 11 Soils and Geology, DMRB Volume 11, Section 3 Part 6 Land Use (Agricultural Land only) and DMRB Volume 11, Section 2 Part 5 HA 205/08 Assessment and Management of Environmental Effects (**Ref 12.13**). The methodology will include:

- Completion of an ALC survey;
- Review information of the agricultural quality of land;
- Review baseline soil, geological and environmental information for the study area, including historical mapping to enable an assessment of potential constraints associated with land contamination;
- Review detailed site survey and ground investigation works (once complete) to confirm attribute importance and facilitate assessment of potential contaminant linkages;
- List and assess potential impacts;
- Assess the sensitivity of the attributes; and
- List and assess the likely significance of the effects.

12.7.8. The potential impacts will take into consideration both the construction and operational phases of the Scheme. Contaminated land issues will be assessed in accordance with Model procedures for the Management of Contaminated Land (CLR11) (**Ref 12.12**). The document advocates the use of a Conceptual Site Model (CSM) to establish the links between a potentially hazardous source and a sensitive receptor via an exposure pathway. The concept behind this approach is that, without each of the three fundamental elements (source, pathway and receptor), there can be no risk from contamination. Thus, the mere presence of a contamination hazard at a particular site does not necessarily imply the existence of associated risks.

12.7.9. The following elements of the Scheme are relevant to the assessment of effects of geology and soils:

- Land Take – As part of the construction phase of the Scheme, areas of existing land use (e.g. agricultural) to be converted to Highway. As part of the construction phase, there will also be temporary areas of land take, for use as construction compounds;
- Earthworks – As part of the construction and preparation phase of the Scheme, there will be elements of soil excavation and ground preparation;
- Land Uses – Highway and areas of soft landscaping (i.e. embankments) where contaminated soils may be present at / or near the surface; and
- Construction of foundations (e.g. piling for bridge crossings) and below ground utility structure – Creation of enclosed spaces and placing below ground structures / services (e.g. box culverts) into the ground.

ASSESSMENT CRITERIA

12.7.10. The likely significant environmental effects are assessed based on consideration of the sensitivity of receptors and the predicted magnitude of the potential effects. The magnitude of the impact on the identified receptor / receiving environment is assessed as major, moderate, minor or negligible. The significance of the effect on identified receptors / receiving environments is assigned a significance category on a scale ranging from very large to neutral. Professional judgement in consideration of the guidance provided in DMRB Volume 2 Part 5 HA 205/08 will be used to assess the magnitude of impact and significance of the effect.

12.8 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

12.8.1. This Scoping Report is based on currently available information.

12.8.2. A ground investigation scheduled to be completed in 2018. The information obtained as part of this ground investigation will be utilised to further refine the baseline conditions and characterise potential risks prior to completion of the EIA.

12.8.3. Initial consultation with NCC with regards to the presence of RIGS within the study area and their opinion of any effects the Scheme may have in relation to contaminated land.

12.8.4. An ALC survey has not been completed for the study area. An ALC survey will be completed as the Scheme progresses and the information provided will be incorporated into completion of the EIA.

13 POPULATION AND HUMAN HEALTH

13.1 INTRODUCTION

13.1.1. This Chapter considers the likely impacts on Population and Human Health during the construction and operational phases of the Scheme and any potential significant effects. It sets out the proposed methodology for assessing the impact on Population and Human Health and identifies those impacts that can be scoped out of the EIA.

13.1.2. This Chapter considers the main area of the Scheme, the Main Compound and the Lionheart Enterprise Park Compound.

13.1.3. In line with current guidance from Highways England on implementing the Requirements of 2011/92/EU as amended by 2014/52/EU (EIA Directive), the following topics are considered relevant to this assessment:

- Population
  - Physical Assets and Land Use
  - Community Amenity and Severance
  - Non-Motorised Users (NMUs) (including Pedestrians, Equestrians and Cyclists)
  - Economy and Employment
- Human Health
  - Air Quality
  - Noise and Vibration
  - Road Drainage and the Water Environment
  - Vehicle Travellers

13.1.4. In addition to the above, the following information is also included and evaluated, as appropriate:

- Population – qualitative information on access to/loss of open/green space and/or recreational facilities;
- Human health – quantitative information on the public health profile; and
- Human health – quantitative information on the economic profile.

13.1.5. This Chapter has been informed by the methodology set out in DMRB Volume 11 Section 3 Part 6: Land Use (**Ref. 13.1**), Part 8: Pedestrians, Equestrians, Cyclists and Community Effects (**Ref. 13.2**), and Part 9: Vehicle Travellers (**Ref. 13.3**) and associated Interim Advice Notes. DMRB Interim Advice Note 125/15105 (2015) sets out the requirement to combine DMRB Vol 11: Section 3: Parts 6, 8 and 9 into one chapter titled 'People and Communities' (**Ref. 13.4**) which has also been adhered to, as well as IAN 195/16 'Cycle Traffic and the Strategic Road Network' (**Ref.13.5**).

13.1.6. This chapter should be read together with the introductory chapters of this Scoping Report (**Chapters 1 - 5**) as well as **Chapter 16 – Assessment of Cumulative Effects**.

13.2 STUDY AREA

13.2.1. DMRB Volume 11, Section 3 (Parts 6, 8 and 9) do not specify a scheme assessment area when considering the effects of a road Scheme on physical assets, NMUs, communities, or vehicle travellers. As such, the study area has been defined on a Scheme-specific basis (in terms of the extent and characteristics of the Scheme, location of the Scheme (e.g. characteristics and sensitivities of communities and associated amenities / facilities)) and on past experience of road Schemes and expert judgement. The study areas set out below apply to the main area of the Scheme and the construction compounds.

POPULATION

Physical Assets and Land Use

13.2.2. Physical assets including commercial and residential properties within and immediately surrounding the red line boundary of the Scheme will be considered. Land use will consider recreational facilities and green / open spaces and their associated access routes within and immediately surrounding the red line boundary.

Community Amenity and Severance

13.2.3. Given the potential for changes in traffic flow during the construction and operational phases of the Scheme, potential impacts on local communities and amenity could be widespread. Based on professional judgement, the assessment will focus on the local level (within 1 km of the Scheme) as there are more likely to be

significant effects at this level. Should significant effects be identified beyond 1 km, these will be included in the detailed assessment. Regard has also been given to any specific community facilities further afield that are identified as likely to experience an impact. Only one community receptor in Ellingham has been included within the assessment, the rest have been scoped out of the assessment due to the distance of Ellingham from the Scheme.

Non-Motorised Users

13.2.4. The assessment of NMU will focus on access and journey amenity for pedestrians, cyclists, and equestrians. The study area includes those PRoWs and NMU access routes within and up to 500 m from the red line boundary.

Economy and Employment

13.2.5. Although the Scheme is primarily near Alnwick and Ellingham, one of the temporary construction compounds is near West Thirston which is between Morpeth and Felton. Therefore, as the Scheme (including the temporary construction compounds) is located within Northumberland, the 'local level' comprises Northumberland.

13.2.6. Given the scale of the Scheme, economic linkages and travel to work patterns, the employment effects of the Scheme are considered to extend beyond Northumberland. Based on the travel to work information identified in the Census 2011 (**Ref. 13.6**), a larger number of workers travel throughout the North East of England. As such, the 'regional level' has been set as the North East of England.

HUMAN HEALTH

Air Quality

13.2.7. Air quality impacts will be drawn from the Air Quality assessment being undertaken as part of the EIA. For further information, see **Chapter 6 – Air Quality** of this Scoping Report.

Noise and Vibration

13.2.8. Noise and vibration impacts will be drawn from the Noise and Vibration assessment being undertaken as part of the EIA. For further information, see **Chapter 7 – Noise and Vibration** of this Scoping Report.

Road Drainage and the Water Environment

Road drainage and water environment impacts will be drawn from the Road Drainage and Water Environment assessment being undertaken as part of the EIA. For further information, see **Chapter 11 – Road Drainage and the Water Environment** of this Scoping Report.

Vehicle Travellers

13.2.9. Potential impacts on vehicular travellers could be widespread (given the potential for changes in traffic flow during the construction and operational phases of the Scheme) and for this reason, it is difficult to determine an appropriate study area in relation to this sub-topic. For the purposes of assessing vehicular travellers and driver stress, the study area will therefore include the area within the red line boundary and the existing A1 up to 500 m from the red line boundary, where impacts are most likely to be experienced by vehicle travellers.

13.3 BASELINE CONDITIONS

13.3.1. A variety of data sources have been consulted to inform the baseline review, including (but not limited to):

- Census 2011 (**Ref 13.6**);
- Office of National Statistics Labour Market Statistics Report (NOMIS) (**Ref 13.7**); and
- Office of National Statistics Indices of Multiple Deprivation 2015 (**Ref. 13.8**).

GEOGRAPHICAL CONTEXT

13.3.2. Where relevant (and available) data within this Chapter is presented for the following geographies:

- National (England);
- Regional (North-East);
- County (Northumberland); and
- Ward (Longhoughton, Lesbury, and Alnwick)

MAIN SCHEME AREA

POPULATION

Population Density

13.3.3. The resident population of each ward is broadly similar; however, population density is considerably higher within Alnwick (31.0 persons/hectare) compared with Longhoughton and Lesbury (0.2 persons/hectare and 0.6 persons/hectare respectively). This reflects the considerable level of residential development within Alnwick ward compared with surrounding localities. Population density within Northumberland (0.6 persons/hectare) is notably lower than both the North East and England averages (3.0 persons/hectare and 4.1 persons/hectare respectively), emphasising the rural nature of the county. The population and density at ward level as of 2011 is provided in **Table 26**.

13.3.4. These data are based on the 2011 Census; however, ONS data confirm that inward and outward migration to Northumberland overall is relatively stable as the total resident population of Northumberland was estimated at 319,000 in 2017 (**Ref. 13.7**), only 3,000 higher than in 2011. Therefore, the total resident population in individual wards is unlikely to have changed significantly. The resident population of each ward is broadly similar; however, population density is considerably higher.

Table 26 Population and density at ward level (2011)

Study geography	All usual residents	Density (number of persons per hectare)
Lesbury	5,069	0.6
Alnwick	4,766	31.0
Longhoughton	4,424	0.2

13.3.5. The estimated population and density of Northumberland, North East Region and Northumberland is provided below in **Table 27**.

Table 27 Population (2017)

Study geography	All usual residents	Density (number of persons per ha)
England	64,169,400	4.9
North East Region	2,644,700	3.1
Northumberland	319,000	0.6

Age Breakdown

13.3.6. The population aged 15 years and under in Northumberland (17.1%) is broadly in line with the England average (18.9%), however there is a slightly higher proportion of adults over the age of 65 in Northumberland (20.2%) compared with England (16.3%). Further information is provided within **Table 28**. Census 2011 data (**Ref 13.6**) therefore indicate that Northumberland has a slightly older demographic, and residents therefore likely to have an increased vulnerability to health issues when compared to the England average. The proportion of individuals aged 16-64 as of 2017 is 59.7%; as such, there is a similar proportion to that identified in the Census 2011.

Table 28 Indicators of the age structure for Northumberland compared to England

Indicator	Period	% in Northumberland	% in England
Population aged 15 and under	2011	17.1	18.9
Population aged 16-64	2011	62.9	64.8
Population over 65	2011	20.2	16.3

Life Expectancy

13.3.7. As shown in Table 29, data from Public Health England (PHE) identify that there is a gap in life expectancy of 9.4 years for males and 6.2 years for females between the most and least deprived areas within Northumberland, indicating a moderate level of health inequity within the county. This is most acute among male residents who experience a higher level of health inequity than female residents.

Table 29 Difference in life expectancy between the most and least deprived areas within Northumberland (2013-15

Indicator	Male	Female
Life expectancy gap between most and least deprived areas	9.4 years	6.2 years

Indices of Multiple Deprivation

13.3.8. The Indices of Multiple Deprivation 2015 (IMB2015) uses a combination of information relating to income, employment, education, health, skills and training, barriers to housing and services and crime to create an overall score of deprivation. A low score indicates greater deprivation; hence the most deprived area is indicated by a rank of 1.

13.3.9. In 2015, Northumberland had a rank of 145 out of 326 local authorities in England. This places Northumberland in the top 50% most deprived local authorities within England.

13.3.10. The majority of Lower Super Output Areas (LSOA) in the vicinity of the Scheme fall within the 50% least deprived areas within England. The exception is one of the LSOAs in Alnwick ward, which is categorised as falling within the 10% least deprived LSOAs in England. As such, overall levels of deprivation within proximity of the Scheme are relatively low.

HEALTH

13.3.11. A summary of indicators compiled by PHE provide an overall picture of the health of the population within Northumberland compared with England levels. This is reproduced in **Table 30**.

13.3.12. There are a number of indicators where Northumberland has a slightly worse level of health than England as a whole: rates of excess weight in children (aged 10-11) and excess weight in adults within Northumberland are slightly higher than the England average. Life expectancy at birth for both males and females is slightly lower (i.e. worse) within Northumberland than the England average. Mortality rates for those people under 75 from cancer are slightly higher (i.e. worse) within Northumberland than the England average. The suicide rate in Northumberland is also slightly higher (i.e. worse) than the England average.

13.3.13. Within Northumberland, there are some indicators which suggest that health is better than the England average however: Mortality rates in Northumberland for those people under 75 from cardiovascular disease are slightly lower than the England average. Smoking prevalence in Northumberland is slightly lower than the England average. The proportion of physically active adults in Northumberland is higher (i.e. better) than the England average.

Table 30 Indicators of population health for Northumberland compared with England (2018)

Indicator	Period	Northumberland	England
Obese children (aged 10-11)	2016/17	21.1	20.0
Excess weight in adults	2016/17	63.8	61.3
Life expectancy at birth – males	2014-16	79.2	79.5
Life expectancy at birth – females	2014-16	82.6	83.1
Under 75 mortality: all causes	2014-16	340.5	333.8
Under 75 mortality: cardiovascular	2014-16	72.7	73.5
Under 75 mortality: cancer	2014-16	139.1	136.8

Indicator	Period	Northumberland	England
Emergency hospital admissions COPD	2011-2016	3%*	2.2%*
Respiratory disease as a cause of death	2011-2015	14.5%*	13.8%*
Suicide rate	2014-16	11.0	9.9
Smoking prevalence in adults	2017	13.0	14.9
Percentage of physically active adults	2016/17	67.2	66.0

*North East data from PHE Local Health report (Ref 13.10), data specifically for Northumberland not available

13.3.15. PHE also publish data on collision rates for NMUs and vehicle travellers who are killed or seriously injured on roads (as reproduced in **Table 31**). For the period 2014-16, there is a moderately higher incidence of fatalities or serious road accidents within Northumberland compared with England, as outlined below. This suggests that roads and road safety in Northumberland are likely to be poorer and potentially more dangerous than within England.

Table 31 Indicator of collision risk in Northumberland compared with England (2014-2016)

Indicator	Period	Local value	England Value
Killed and seriously injured on roads	2014-16	52.5	39.7

PHYSICAL ASSETS AND LAND USE

13.3.16. There are a number of residential properties located within the red line boundary. These include:

- West Linkhall located immediately adjacent to the west of the A1 and accessed via a loop road off the A1;
- Loaning Head, Broom Ho, and Heckley Ho (located approximately 400 m west of the A1) situated to the north of Denwick Junction and can also be accessed via the B 6341 which runs parallel to the A1 to the west;
- Goldenmoor (located approximately 250 m east of the A1) situated to the north of Denwick Junction and can also be accessed via the B1340;
- Charlton Mires (two residential properties located immediately adjacent to the east of the A1) which are accessed from the A1;
- Two properties (located to the east of the A1, directly adjacent to Charlton Miles) which are also accessed from the B6347; and
- Rock South Farm and Rock Midstead, (located approximately 600 m east of the A1) all of which have use of direct access roads and do not rely on access via the A1.

13.3.17. There are a number of residential properties situated beyond the red line boundary but within close proximity to the Scheme. These include:

- Patterson Cottage which has direct access off the A1; and
- Charlton Hall and East Linkhall (also located approximately 600 m east of the A1) which have use of direct access roads and do not rely on access via the A1.

13.3.18. Only one commercial property relies on access from the A1; Patterson's Cottage (formerly Baseys of Alnwick Pet Boarding, Day Care and Grooming) which is situated immediately adjacent to the west of the A1. There are a number of other commercial assets within close proximity of the red line boundary (such as Reading Rooms Cottage, Rock Lodge, Rocking Horse Café & Gallery and Beal ME & Sons); however, these assets do not have direct access to/from the A1.

13.3.19. Within 1 km of the Scheme there are a wide range of open and recreational spaces that serve both Alnwick and the wider area. These are predominantly located in Alnwick and include sports clubs, schools with significant areas of playing fields and children's play areas. In addition, Alnwick Garden is located approximately 1.2 km to the south west of Denwick Junction. To the north of Alnwick, to the east and west of the A1, there small pockets of woodland which some of the PRoW described in **Table 33** below run through.

13.3.20. There is no land within the Main Scheme Area that has been allocated for development within the Alnwick District Wide Local Plan. Within the Northumberland Local Plan Draft Policies Map, an area has been identified as suitable for wind turbine development (Policy REN2) to the west of the existing A1 between approximately West Linkhall and North Charlton.

COMMUNITY AMENITY AND SEVERANCE

13.3.21. Community receptors within 1 km of the Scheme are outlined in **Table 32**. Most of the community receptors are located within Alnwick. One school located in Ellingham lies slightly beyond 1 km from the red line boundary, however has been included due to the sensitivity of the receptor. There are no other community receptors included within the assessment within Ellingham, due to their distance from the Scheme.

Table 32 Community facilities proximate to the Scheme

Type of facility	Name
Education	Ellingham C of E Primary School
	The Duchess's Community High School (and adjacent playing fields)
Primary Healthcare	Genix Healthcare NHS Dentist
Sports and Recreation	Alnwick Rugby Football Club
	Willowburn Leisure Centre
	St James Park
	Alnwick Cricket Club
Places of Worship and Burial Grounds	Alnwick Cemetery

NON-MOTORISED USERS

13.3.23. The closest National Cycle Route the Scheme is the Coast and Castles South route (Sustrans Route 1) which runs along the Northumberland coastline and crosses the A1 approximately 20 km north of Alnwick. As such, there are no National Cycle Routes which require consideration in relation to the Scheme. There are no National Trails within the vicinity of the Scheme.

13.3.24. There are 19 PRoW which lie within the study area (up to 500 m from the red line boundary of the Main Scheme Area) with the majority located to the east of the A1. These form a coherent network, linked in some places by minor roads, and offer a high level of recreational value for users. PRoW also offer NMUs traffic free routes which create linkages between rural communities. Dependent on their classification, they provide permissible access for pedestrians, cyclists and equestrians.

13.3.25. PRoW are paths that the public have the right to use at any time. There are four types of PRoW classified by NCC: footpaths (users have the right to pass on foot, dogs are allowed provided they are kept under control and wheelchairs are able to be used), bridleways (users have the rights of footpath users and horses and bicycles may also be ridden or walked), byways (all users have the right to use the path, including those in mechanically propelled vehicles) and restricted byways (all of the rights of a byway apply and additionally a non-mechanically propelled vehicle can be used).

13.3.26. **Table 33** provides a qualitative description of the PRoWs within the Alnwick to Ellingham study area. PRoW have been identified by using the NCC PRoW interactive map (Ref 13.11).

Table 33 Summary of PRoWs within the Alnwick to Ellingham study area

PRoW ref.	PRoW Type	Description
110/004	Footpath	Follows the local road network north of Alnwick northwards to the existing A1 near to Broom House Farm, where it connects to footpath 129/014 on the opposite side of the A1.

PRoW ref.	PRoW Type	Description
129/014	Footpath	Continues the line of 110/004 north through agricultural land, connecting with the wider PRoW network, via byway 129/022.
110/013	Byway	Follows a west/east alignment along the local road network near Heckley House to the A1, where it continues east of the A1 via byway 129/022.
129/022	Byway	Runs from the A1 (where it adjoins 110/013) west along a continuous route to the village of Rennington, connecting with several other footpaths, agricultural tracks and local roads.
129/023	Byway	Travels north from the intersection of 129/022 and 110/011 at Broxfield and splits into 129/005 and 120/023.
110/019	Footpath	Runs from the B6341 near Heiferlaw Tower west of the A1 and continues east on the opposite side of the A1 along 129/009 and connects with a network of PRoW from Rock South Farm.
110/003 / 129/009	Footpath	A single path crossing a ward boundary. Runs from the A1, where it continues the line of 110/019, to Rock South Farm, where it connects with a network of other PRoWs and a minor road.
110/010	Footpath	Runs from west to east along a track from the B6341 at Heiferlaw Bank to the A1.
129/005	Footpath	Runs northwards from Rock South Farm parallel to the A1 and connects to 'the Avenue' (129/004) and the local road network to Rock, Rock Midstead and Rock Moor House. Also runs south from Rock South Farm and connects to PRoW 129/023.
129/006	Footpath	Runs north eastwards from Rock South Farm to Rock.
129/024	Footpath	Located on the western side of the A1 and connects the B6341 near Rock Lodge to the A1. Its line is continued eastwards on the opposite side of the A1 by footpath 129/004.
129/004	Footpath	Continues the line of the footpath 129/024 eastwards from the A1 adjacent to 'the Avenue' past Rock Midstead to Rock Hall and Rock.
112/009	Bridleway	Runs north to south from West Linkhall and connects West Linkhall (west of the A1), with Craggy Wood and South Charlton to the southwest.
112/008	Footpath	Runs west to east and connects West Linkhall (which is west of the A1) with Craggy Wood and the wider PRoWs network.
112/037/218/024	Bridleway	Follows a north/south route from a layby on the east side of the A1 opposite North Charlton to connect with a network of minor roads near Tynely and footpath 112/007.
112/007/218/023	Footpath	Runs parallel to Charlton Burn and runs west to east and links with the wider PRoW network and minor roads in an area of high recreational use. It connects to 112/037 (a bridleway) which continues south parallel to the A1, 218/024 which runs north towards Brownieside, and 218/023 which continues east.
218/004	Footpath	A small portion of this footpath runs parallel to the A1, then follows an east/west alignment connecting to bridleway 218/024.
126/026	Bridleway	This bridleway is located to the east of the Scheme and passes adjacent to the Combs Plantation and Doxford Farm. It connects to PRoW 218/026 to the north.

13.3.27. **Table 34** shows the NMU counts from user surveys conducted between July and September 2016. It shows that the busiest recorded pedestrian movements were observed in the North Charlton east and west areas, whilst the busiest PRoW was Bridleway 112/009 at West Linkhall. The table suggests that the highest numbers of pedestrian movements were on non-designated and non-PRoW routes (e.g. pavements).

13.3.28. The same usage pattern was observed for cycling routes, with most cyclists recorded in the North Charlton east and west areas.

13.3.29. Nine equestrian users were recorded at Broxfield Farm and Rock South Farm, both located to the east of the A1. Equestrians were noted moving away from the A1 and did not cross the A1. This indicates that in the area within and adjacent to the red line boundary, equestrian use is likely to be low.

13.3.30. **Table 34** shows that the highest usage levels were concentrated at Broxfield, Rock South Farm and North Charlton. Broxfield and Rock South Farm both lie approximately 800 m east of the A1 but provide direct linkages to the A1 via PRoW, and connect with the wider PRoW and NMU network. The two survey locations at North Charlton lie either side of an existing grade- separated crossing of the A1 (an underpass), and are linked to PRoW or other NMU routes. Together, the results from these survey locations suggest that usage of crossings or connected routes which provide access across the A1 typically experience higher levels of usage than other local PRoW (which do not provide NMU across the A1) and this may be the same at other locations within and local to the red line boundary which offer similar A1 crossings.

Table 34 NMU counts for the survey area

Public Right of Way	Site NMU Totals	Pedestrians	Cyclists	Horse riders
Footpaths 110/004 continuing as 129/014 crossing A1	4	4	0	0
Byway 110/013 continuing as 129/02	3	3	0	0
Footpath 110/019 across A1 as 110/003 and 129/009	2	1	1	0
Footpaths 129/021 and 110/110 and road to Rock South Farm	2	0	2	0
Broxfield *but not crossing A1, only movements to A1 used	89	30*	0	0
Rock South Farm *but not crossing A1, only movements to A1 used	71	25**	0	4
Footpath 129/024 and 129/004	2	0	2	0
B6341, B6347 and A1 Rock Lodge junction	19	7	12	0
A1/B6347 Charlton Mires Junction	20	3	17	0
Bridleway 112/009 at West Linkhall	17	14	3	0
North Charlton West	86	58	28	0
North Charlton East	38	23	15	0

* Only movements to the A1 used and does not include movements crossing the A1
** Only movements to the A1 used and does not include movements crossing the A1.

ECONOMY AND EMPLOYMENT

13.3.31. According to NOMIS (**Ref. 13.6**) the job density levels in 2016 (i.e. the ratio of jobs available divided by the resident population aged between 16 and 64) are lower in Northumberland (0.65) compared to the North East of England average of 0.71. The job density levels in Northumberland and North of England are lower than the average Great Britain (0.84), indicating less availability of employment and labour demand.

13.3.32. **Table 35** outlines the proportions of the working age population (defined by the ONS as all residents aged 16-64 years old) who are economically active. A high economic activity rate means that a high proportion of the population is currently employed, looking for work, or undertaking training.

13.3.33. The data indicate that rates of economic activity in Northumberland are broadly in line with both the North East and England averages. This is also reflected at a ward level, with economic activity rates in Alnwick and Longhouton recorded as marginally higher than those within Lesbury and Northumberland. Economic activity rates within Longhoughton are likely to reflect the high proportions of the local workforce who are employed at Royal Air Force base (RAF) Boulmer, which is located within the ward.

Table 35 Economic Activity in the wards (2011)

Area	All usual residents aged 16 to 64	Economically active	Economically inactive
Lesbury	3,721	67.5%	32.5%
Alnwick	3 413	70.0%	30.0%
Longhouton	3,275	71.5%	28.5%

13.3.34. As shown in **Table 36,** there is a higher proportion of individuals classified as 'economically active' in Northumberland (78.1%) compared with the average across the North East of England (75.4%) and Great Britain (76.6%).

Table 36 Economic Activity in Northumberland, North East of England and Great Britain (2017)

Area	All usual residents aged 16 to 64	Economically active	Economically inactive
Great Britain	64,169,400	76.6	23.4
North East	2,644,700	75.4	24.6
Northumberland	319,000	78.1	21.9

Employment by Industry

13.3.35. Employment by industry across Lesbury, Longhoughton and Alnwick, as identified in the Census 2011, shows broadly similar patterns of activity for the majority of industries, with two exceptions. The proportion of residents within Longhoughton who are employed in the Agriculture, forestry and fishing sector (7.3%) which is considerably higher than the proportions within Lesbury and Alnwick (2.9% and 1.0% respectively). Similarly, the proportion of Longhoughton residents who are employed in 'Public administration and defence, compulsory social security' (25.5%) is considerably higher than in Lesbury (10.8%) and Alnwick (10.2%). This is likely to be attributable to RAF Boulmer which is situated in Longhoughton and operates the only RAF Station in Northumberland. The employment by industry sector is set out in **Table 37**.

Table 37 Employment by Industry by Ward (2011)

Industry	Lesbury	Longhoughton	Alnwick
A Agriculture, forestry and fishing	2.9%	7.3%	1.0%
B Mining and Quarrying	0.3%	0.5%	0.4%

Industry	Lesbury	Longhoughton	Alnwick
C Manufacturing	4.6%	4.4%	5.2%
D Electricity, gas, steam and air conditioning supply	0.4%	0.3%	0.3%
E Water supply, sewage, waste management and remediation activities	0.5%	0.5%	1.0%
F Construction	9.2%	5.0%	8.6%
G Wholesale and retail trade; repair of motor vehicles and motor cycles	12.2%	10.4%	17.7%
H Transport and storage	3.4%	2.9%	3.0%
I Accommodation and food service activities	8.4%	7.1%	9.4%
J Information and communication	1.8%	1.7%	2.3%
K Financial and insurance activities	1.8%	1.4%	0.9%
L Real estate activities	2.9%	1.4%	1.5%
M Professional, scientific and technical activities	6.6%	4.7%	5.5%
N Administrative and support service activities	3.6%	3.2%	4.4%
O Public administration and defence; compulsory social security	10.8%	25.5%	10.2%
P Education	10.4%	8.3%	8.7%
Q Human health and social work activities	13.1%	11.2%	13.9%
R, S, T, U Other	6.9%	4.2%	5.9%

13.3.36. NOMIS states that the estimated total number of employees in Northumberland (i.e. the local level), as of 2017, is 101,000 (**Ref. 13.6**). NOMIS states that the total estimated number of employees within North East of England (i.e. the regional level), in 2017, is 1,173,000.

13.3.37. The employment by industry sector is set out in **Table 38** the largest sector is Services (Industry Sectors G-S) across Northumberland, the North East of England and Great Britain. The proportion of individuals employed in Industry Sector F – Construction is the same in Northumberland (4.0%) as the regional average across the North East of England (4.0%); however, this proportion of the workforce is lower than the average across Great Britain (4.6%).

Table 38 Employment by Industry (2017)

Industry	Northumberland	North East of England	Great Britain
B Mining and Quarrying	0.2%	0.2%	0.2%
C Manufacturing	10.9%	10.8%	8.1%
D Electricity, gas, steam and air conditioning supply	0.3%	0.4%	0.4%

Industry	Northumberland	North East of England	Great Britain
E Water supply, sewage, waste management and remediation activities	1.5%	0.5%	0.7%
F Construction	4.0%	4.0%	4.6%
G Wholesale and retail trade; repair of motor vehicles and motor cycles	15.8%	14.7%	15.3%
H Transport and storage	3.5%	4.2%	4.9%
I Accommodation and food service activities	10.9%	7.8%	7.5%
J Information and communication	1.2%	2.7%	4.2%
K Financial and insurance activities	0.7%	2.1%	3.6%
L Real estate activities	1.7%	1.6%	1.6%
M Professional, scientific and technical activities	5.9%	5.8%	8.6%
N Administrative and support service activities	5.9%	5.8%	8.6%
O Public administration and defence; compulsory social security	3.5%	6.5%	4.3%
P Education	8.9%	9.7%	8.9%
Q Human health and social work activities	18.8%	16.5%	13.3%
R Arts, Entertainment and Recreation	3.5%	2.8%	2.5%
S: Other Service Activities	2.2%	1.9%	2.1%

Earnings

13.3.38. Earnings data for Northumberland provide information on the average weekly income of residents currently in employment, as outlined in **Table 39.** Average weekly wages in Northumberland for full time employees (£504.10) are observed to be slightly lower that the England average (£550.40). This indicates that the performance of the local economy is slightly poorer in Northumberland than in England as a whole.

Table 39 Comparison of average weekly wages in Northumberland with Great Britain

Qualification	Period	Average Weekly Wage in Northumberland	Average Weekly Wage in the United Kingdom
Full-time	2017	£504.10	£550.40

HUMAN HEALTH

Income Deprivation

13.3.39. The PHE Local Health Report (**Ref 13.12**) shows that the North East has a somewhat higher proportion of people who experience income deprivation (18.8%) compared with the England average (14.6%); defined by the IMD as those people that are out-of-work, and those that are in work but who have low earnings (**Ref 13.13**). The indicator of income deprivation is provided in **Table 40**.

Table 40 Indicator of income deprivation for the North East when compared with England

Indicator	Period	% in North East	% in England
% income deprivation	2011	18.8	14.6

Qualifications

13.3.40. **Table 41** shows that the proportion of the adult population in Northumberland who have no qualifications (9.6%) is marginally higher than the national average (8.0%). Similarly, the adult population who hold qualifications of NVQ Level 4 and above (degree level) in Northumberland (31.7%) is slightly lower than the UK average (38.4%); suggesting that educational attainment within Northumberland is overall slightly worse than nationally.

Table 41 Comparison of the proportion of adults obtaining recognised qualification in Northumberland with Great Britain

Qualification	Period	% Northumberland Adult Population	% United Kingdom Adult Population
NVQ 4 and above	2017	31.7	38.4
NVQ 3 and above	2017	52.1	57.0
NVQ 2 and above	2017	72.6	74.5
NVQ 1 and above	2017	84.1	85.2
No qualifications	2017	9.6	8.0

AIR QUALITY, NOISE AND VIBRATION AND ROAD DRAINAGE AND THE WATER ENVIRONMENT

13.3.41. Baseline conditions for air quality, noise and vibration, and road drainage and the water environment are outlined within other sections of this Scoping Report. Results will be incorporated into the Population and Health Assessment to inform the assessment of human health and impacts on vulnerable groups and presented in the ES.

VEHICLE TRAVELLERS

13.3.42. The existing stretch of the A1 relevant to the Scheme experiences slight delays for vehicle travellers under baseline conditions. Delays are more prevalent on the minor roads that adjoin the A1 due to drivers having to wait for a gap in traffic to merge onto the A1 carriageway. During current baseline operation, driver stress is considered to be 'moderate' or 'high'.

13.3.43. The gently rolling landscape surrounding the Scheme affords views from sections of the existing A1 that are not screened by lines of trees, woodland and / or embankments running parallel to the A1. The landscape characters within the vicinity of the Scheme is described in **Chapter 8 – Landscape and Visual Amenity**.

LIONHEART ENTERPRISE PARK COMPOUND

13.3.44. The baseline findings for the study area surrounding the Lionheart Enterprise Park Compound are the same as those outlined for the above for the Main Scheme Area as they are assessed on a Regional basis, aside from those outlined below:

PHYSICAL ASSETS AND LAND USE

13.3.45. The closest residential properties are located approximately 400 m to the south-west (Greensfield Moorhouse) and 150 m to the north east (East Cawledge) of the Lionheart Enterprise Park Compound.

13.3.46. The proposed Lionheart Enterprise Park Compound red line boundary is located approximately 250 m east of the A1, on the outskirts of the Alnwick Lionheart Enterprise Park Compound. The Lionheart Enterprise Park Compound also comprises of a number of commercial and light industrial premises. The Lionheart Enterprise Park Compound is accessed via an unnamed A-Road which adjoins the A1068.

13.3.47. The closest formal recreational spaces to the Scheme are the playing fields at The Duchess's Community High School which is located approximately 350 m to the west of the Lionheart Enterprise Park Compound on the opposite side of the A1. Approximately 850 m to the west are the Alnwick Rugby Football Club field and

Alnwick Town Football Club Fields. The Willowburn Sport & Leisure Centre is also located approximately 650 m to the west.

13.3.48. The majority of the area within the Lionheart Enterprise Park Compound is allocated as a Key General Employment Area (Policy ECN7) within the Northumberland Local Plan Draft Policies Map.

COMMUNITY AMENITY AND SEVERANCE

13.3.49. The Duchess's Community High School is located approximately 350 m to the west of the Lionheart Enterprise Park Compound on the opposite side of the A1.

NON-MOTORISED USERS

13.3.50. There are no National Trails or National Cycle Routes within 500 m of the red line boundary. There are four PRoW within 500 m of the red line boundary, as set out in **Table 42.**

Table 42 PRoW within 500 m of the Lionheart Enterprise Park Compound

PRoW ref.	PRoW Type	Description
104/029	Footpath	Runs along Willowburn Avenue and stops at the roundabout which connects Willowburn Avenue to the A1.
141/022	Footpath	Runs perpendicular to the A1 and starts to the west of the proposed location for the Lionheart Enterprise Park Compound and finishes at the unnamed road which provides access to Redfoot Lea Bed and Breakfast.
141/013	Footpath	Continues on from PRoW 141/022 along the southern-most boundary of the Lionheart Enterprise Park Compound towards Nabs Plantation.
141/014	Footpath	Starts from the A1 and runs from west to east along an unnamed road which provides access to the properties to the north of Lionheart Estate, directly to the north of Cawledge Burn.

MAIN COMPOUND

13.3.51. The baseline findings for the study area surrounding the Main Compound are the same as those outlined above for the Main Scheme Area as they are assessed on a Regional basis, aside from those outlined below:

PHYSICAL ASSETS AND LAND USE

13.3.52. There are number of residential receptors within vicinity of the red line boundary: To the west, on the other side of the A1, are two residential properties located approximately 400 m away called West Moor Houses. Approximately 200 m to the east is are a grouping of properties called Thirston New Houses.

13.3.53. Eshott Airfield is located immediately south of the Compound. Approximately 700 m to the west, on the other side of the A1, on the road perpendicular to the A1 is Northumberland Canine Centre. Along this road, within 500 m of the Compound, there is one commercial property, which appears to be a construction yard.

13.3.54. There are no open or recreational spaces within or immediately surrounding the Scheme. There is no land within the Main Compound that has been allocated for development within the Northumberland Local Plan Draft Policies Map.

COMMUNITY AMENITY AND SEVERANCE

13.3.55. There are no community receptors within 1 km of the Scheme.

NON-MOTORISED USERS

13.3.56. There are no National Trails or National Cycle Routes within 500 m of the red line boundary. There are no PRoW within 500 m of the Scheme.

13.4 POTENTIAL IMPACTS

MAIN SCHEME AREA

CONSTRUCTION

POPULATION

Physical Assets and Land Use

Residential Properties

13.4.1. There is the potential for two residential properties to be demolished as part of the Scheme. These two properties are East Cottage and Charlton Mires Farm which are located to the east of the Scheme near to the proposed Charlton Mires Junction. As such, there are likely to be significant impacts associated with the loss (i.e. demolition) of these two residential properties.

13.4.2. During construction, residents within residential properties surrounding the red line boundary (directly adjacent to the A1) are likely to experience periods of disruption to their access to and from properties. In particular, South Rock Farm and Linkhall Cottages have the potential to experience impacts associated with accessibility during construction.

13.4.3. There are a number of residential properties which are not directly adjacent to the A1 but will be proximate to areas where construction works will take place. In particular, Loaning Head, Broom Ho, Goldenmoor, Heckley Ho, Heckley Fence, and Rock Midstead have the potential to experience impacts associated with accessibility during construction.

Commercial Properties

13.4.4. There is no requirement for any commercial properties to be demolished as part of the Scheme. As such, there will be no impacts associated with the loss of commercial properties.

13.4.5. Patterson's Cottage (formerly called Baseys of Alnwick Pet Boarding, Day Care and Grooming) is located directly adjacent to the west of the A1 and Rock Lodge Holiday Lets is also located to the west of the A1 but is currently accessed via the B6347. These businesses are likely to experience periods of disruption to access, which has the potential to result in temporary loss in trade, and therefore impacts associated with accessibility during construction.

13.4.6. While there are a number of commercial properties adjacent to the Lionheart Enterprise Park Compound area, there is not anticipated to be any loss of access as alternative routes are available to the Estate. As such, while there is the potential for increased journey times associated with works required by the Scheme during construction (see section: Vehicle Travellers) there are not anticipated to be impacts associated with accessibility to commercial properties on the Lionheart Enterprise Park Compound during construction.

Open Space and Recreation

13.4.7. During construction, it is not envisaged that informal and formal open and recreational spaces will be impacted. This is due to the Scheme not requiring land which is currently utilised for these purposes and the proximity between the Scheme and these spaces (the closest space is over 1 km away).

Development Land

13.4.8. During construction, it is not envisaged that development land will be impacted by the Scheme. This is due to the temporary nature of the construction works (approximately 18 months) and the location of the construction works, which is primarily located outside of the development land.

COMMUNITY AMENITY AND SEVERANCE

Community Amenity

13.4.9. During the construction of the Scheme, there is the potential for a change in amenity value in terms of the presence of construction noise, vibration effects, dust and disruption to views. In particular during the construction phase, noise effects are anticipated (see **Chapter 7 – Noise and Vibration** of this Scoping Report for further detail). As such, there is the potential for residents to experience impacts associated with a loss of amenity during construction.

Community Severance

13.4.10. During construction, traffic management and diversions may lead to vehicular traffic being rerouted off the A1 onto local roads. While diversions will be temporary and are yet to be confirmed, there is the potential for

traffic congestion to arise along diversion routes which could result in community severance. This has the potential to affect residents and their access to community facilities and recreational resources. As such, there is the potential for residents to experience impacts associated with severance during construction, however, any severance effects arising would be short-term.

Non-Motorised Users

13.4.11. Based on current information about the Scheme, it is likely that seven of the 19 PRoW identified would be temporarily closed or diverted during the construction phase. The duration and phasing of these closures is currently unknown and appropriate mitigation for the PRoW identified will be developed during the EIA. The PRoW affected during construction and a consideration of potential impacts on NMUs is outlined within **Table 43** below.

Table 43 Summary of potential effects on PRoWs within the Main Scheme Area study area

PRoW ref.	PRoW Type	Description of potential impact during construction
110/004, continuing east of A1 as 129/014	Footpath	This footpath which runs east/west from the B6341 (informally known as Malcolm's Cross) to Broxfield will be severed by the Scheme and construction phase activities to the west of the A1. It will be required to be diverted approximately 600 m north west of the Scheme, to cross the proposed Broxfield Bridge (which is being constructed as part of the Scheme). This would slightly increase the journey length by over 600 m for NMUs, but is likely to improve accessibility and safety for users as this diversion will remove the need to cross the A1. Footpath 129/014 (the continuation of 110/004 on the eastern side of the A1) is likely to be closed during construction and could be permanently stopped up as NMUs crossing the proposed Broxfield Bridge would connect with Byway 129/022 instead, to continue travelling east of the A1.
110/013 continuing east of A1 as 129/022	Byway	This byway which runs east/west the from the B6341 to Broxfield will be severed by the Scheme and construction phase activities to the west of the A1. The proposed Broxfield Bridge will provide a diversion route for NMUs which is likely to improve accessibility and safety for users as this diversion will remove the need to cross the A1.
110/019, continuing east of A1 as 110/003 and 129/009	Footpath	This footpath which runs east/west from the B6341 to Rock South Farm will be severed by the Scheme. There are no plans to provide a grade-separated crossing here. Measures to address the severance of this footpath will be further considered at the EIA stage.
110/010 and 129/021, continuing east of the A1 as the minor road to Rock South Farm	Footpath/ road	This footpath runs east/west from the B6341 to Rock South Farm continuing east of the A1 as a minor road and will be severed by the Scheme. There are no plans to provide a grade-separated crossing here, and the footpath is too far from other existing grade-separated crossings for a viable diversion to be provided. Measures to address the severance of this footpath will be further considered at the EIA stage.

PRoW ref.	PRoW Type	Description of potential impact during construction
129/004, continuing west of the A1 as 129/024	Footpath	This footpath which runs east/west from the B6341 to Rock Farm will be severed by the Scheme. Approximately 110 m of the footpath lies west of the Scheme (129/024) and 2.5 km east of the A1 (129/004). Footpath 129/004 would be diverted approximately 700 m north to cross the proposed Charlton Mires Compact Grade Separated Junction. This would increase journey length for NMUs by over 700 m, but is likely to improve accessibility and safety for users as this diversion will remove the need to cross the A1. The very short length of the 129/024 west of the A1 means that the length of diversion required to reach the grade separated crossing is unlikely to be viable, particularly given the need to cross a highway intersection. Instead, users of the 129/024 west of the A1 would access the grade-separated crossing at Charlton Mires Compact Grade Separated Junction via the B6341 and B6347. It is anticipated that suitable NMU facilities will be incorporated into the junction.
129/005	Footpath	This footpath provides access to 129/004 and Rock South Farm. This will now be used as the main access track to the property although the PRoW will be maintained and access for NMUs retained. During construction of the Scheme there is likely to be temporary disruption to this footpath.
112/009	Bridleway	Access to the east end of this bridleway is proposed to no longer be from the A1 but via the local access road to West Linkhall. Public rights on this access road are required to be maintained.

Economy and Employment

13.4.12. During construction there is the potential for significant effects in relation to direct, indirect and induced employment opportunities. This has the potential to result in beneficial impacts associated with the economy and employment.

HUMAN HEALTH

Air Quality, Noise and Vibration, and Road Drainage and the Water Environment

13.4.13. Construction and operational phase air quality, noise and vibration, and road drainage and water environment effects will be assessed as part of the EIA and will be considered in the Population and Health section in relation to human receptors, with a particular focus on vulnerable groups of people who are most likely to experience health inequality.

13.4.14. During construction there is the potential for air quality, noise and vibration, and road drainage and water environment effects to arise, which have the potential to impact on human health.

Vehicle Travellers

13.4.15. The Scheme will involve 'online construction' with works taking place on the existing A1 carriageway. As such, there will be a requirement to implement traffic management systems and diversions for vehicle travellers during the construction phase which have the potential to result in increased journey times for vehicle travellers.

13.4.16. Driver stress in relation to vehicle users travelling along routes with construction vehicles, roadworks, or diversions has the potential to be 'moderate' or 'high'. In combination with increased journey times, there is likely to be an increase in driver stress during the construction phase for vehicle travellers

13.4.17. It is anticipated that views from sections of the A1 which remain open during the construction period would be adversely affected. This would be due to the presence of construction work areas and activities where there are currently none. However, due to the temporary nature of the construction period and phasing of construction works it is not envisaged that there would be significant effects.

OPERATION

POPULATION

Physical Assets and Land Use

Residential Properties and Commercial Properties

13.4.18. During operation there are no anticipated effects on physical assets in relation to residential properties or commercial properties.

Open Space and Recreation

13.4.19. During operation, it is not envisaged that open/green space and recreational facilities will be impacted. This is due to the Scheme not requiring land-take which is currently utilised for these purposes and distance between the Scheme and these spaces (the closest space is over 1 km away)

Development Land

13.4.20. It is anticipated that the Scheme would not have significant effects on development land during operation, as the A1 would be widened to the east of its existing route.

Community Amenity and Severance

Community Amenity

13.4.21. During operation there are no anticipated effects on residents in relation to community amenity.

Community Severance

13.4.22. Once the Scheme is operational, vehicular traffic is likely to travel on the most easily accessible route and avoid using local roads in favour of the A1. As such, this would likely relieve any community severance effects experienced along local roads. As such, during operation there are no anticipated adverse effects on residents in relation to community severance, and there may be the potential for beneficial effects in relation to community severance; due to traffic being attracted away from local roads and favouring use of A1.

Non-Motorised Users

13.4.23. It is not currently known whether these closures and diversions would affect PRoW during the operational phase of the Scheme, however where it is not possible to maintain the existing routes of PRoWs, appropriate diversions will be agreed. As such, in addition to the potential for construction phase impacts outlined below, there is also the potential for NMUs to experience operational phase impacts associated with PRoW.

Economy and Employment

13.4.24. During operation there are no anticipated direct impacts on the economy and employment in relation to the Scheme.

HUMAN HEALTH

Air Quality, Noise and Vibration, and Road Drainage and the Water Environment

13.4.25. As mentioned above, operational phase air quality, noise and vibration, and road drainage and water environment effects will be assessed as part of the EIA and will be considered in the Population and Health section in relation to human receptors, with a particular focus on vulnerable groups of people who are most likely to experience health inequality.

13.4.26. Activities within the Construction Compound are likely to have an impact on human health as there is potential for air quality, noise and vibration, road drainage and water environment effects from activities within the Scheme.

Vehicle Travellers

13.4.27. Once the Scheme becomes operational, there is the potential for reduced journey times as the A1 will have additional capacity to carry the strategic, long-distance traffic separately from local traffic. As a result of improved journey times there is the potential for a reduction in driver stress

13.4.28. It is anticipated that views from the Scheme would be similar to current views from the A1. This is due to the nature of the Scheme which primarily includes online widening to east of the existing A1.

LIONHEART ENTERPRISE PARK COMPOUND

CONSTRUCTION

Population

Physical Assets and Land Use

Residential Properties

13.4.29. During construction, residential properties in proximity to the red line boundary are unlikely to experience significant disruption as they do not share access with the Lionheart Enterprise Park Compound. There is likely to be increased traffic movements on the A1 from construction traffic which may affect those properties near to the Compound but this is unlikely to be significant.

Commercial Properties

13.4.30. While there are a number of commercial properties adjacent to the Lionheart Enterprise Park Compound area, there is not anticipated to be any loss of access as alternative routes are available to the Estate. As such, whilst there is the potential for increased journey times associated with works required by the Scheme during construction (see section: Vehicle Travellers), there are not anticipated to be impacts associated with accessibility and / or land-take to commercial properties on the Lionheart Enterprise Park Compound during construction.

Open Space and Recreation

13.4.31. During construction, it is not envisaged that there will be land-take or effects on accessibility of open/green space and recreational facilities. This is due to the scheme not requiring land which is currently utilised for these purposes and the distance between the Lionheart Enterprise Park Compound and these spaces, the closest space is over 350 m away

Development Land

13.4.32. It is anticipated that the Scheme would not have significant effects on development land during construction due to the temporary nature of the construction works (approximately 18 months).

Community Amenity and Severance

Community Amenity

13.4.33. During construction, there is the potential for a change in amenity value due to the increase in construction traffic coming in and out of the Lionheart Enterprise Park Compound. As such, there is the potential for nearby properties / facilities and routes used by NMU to experience impacts associated with a loss of amenity during construction.

Community Severance

13.4.34. As mentioned above, construction, traffic management and diversions may lead to vehicular traffic being rerouted off the A1 and onto local roads. However, as there are no diversions anticipated to access the Lionheart Enterprise Park Compound and the Compound is located on a piece of land which is east of Alnwick, which has direct access to the A1, it is not anticipated that there will be severance of routes connecting the community to facilities.

Non-Motorised Users

13.4.35. As no PRoW will be temporarily closed or diverted as a result of the Lionheart Enterprise Park Compound, there are not anticipated to be any direct effects on NMU. However, there is a potential for a loss of amenity value as noted above.

Economy and Employment

13.4.36. As mentioned above for the Main Scheme Area, during construction there is the potential for significant effects in relation to direct, indirect and induced employment opportunities as well as through expenditure within the local supply chain. This has the potential to result in beneficial impacts associated with the economy and employment.

13.4.37. The effects related to employment economy will be considered for the Scheme as a whole within the EIA.

HUMAN HEALTH

Air Quality, Noise and Vibration, and Road Drainage and the Water Environment

13.4.38. As mentioned above, construction phase air quality, noise and vibration as well as road drainage and water environment effects will be assessed as part of the EIA and will be considered in the Population and Health

section in relation to human receptors. The human health assessment will particularly consider vulnerable groups of people who are most likely to experience health inequality.

13.4.39. Activities within the Lionheart Enterprise Park Compound are likely to have an impact on human health as there is the potential for air quality, noise and vibration, and road drainage and water environment effects from activities within the compound.

Vehicle Travellers

13.4.40. Vehicle users travelling to and from the Lionheart Enterprise Park Compound may experience increased journey times due to traffic management measures or increased presence of construction vehicles accessing the compound.

OPERATION

13.4.41. As the Lionheart Enterprise Park Compound will no longer be required during operation of the Scheme, it is not envisaged that there will be any impacts arising during this phase.

MAIN COMPOUND

CONSTRUCTION

POPULATION

Physical Assets and Land Use

Residential Properties

13.4.42. During construction, the residential properties within vicinity of construction Main Compound near West Thirston are likely to experience periods of disruption to their access to and from properties, in particular Thirston New House, during the construction phase.

Commercial Properties

13.4.43. Eshott Airfield is located immediately south of the Main Compound. Approximately 700 m to the west, on the other side of the A1, on the road perpendicular to the A1 is Northumberland Canine Centre. As the Main Compound is utilising a different access to these facilities, there is not anticipated to the any loss of access to these commercial properties. There is likely to be an increase in the amount of traffic due to construction vehicles which is likely to cause temporary disruption, but not to the extent that the commercial viability of the businesses is compromised.

Open Space and Recreation

13.4.44. During construction, it is not envisaged that there will be land-take or effects on accessibility of open/green space and recreational facilities. This is due to the Scheme not requiring land which is currently utilised for these purposes

Land Development Land

13.4.45. Development Land would not be impacted by the Main Compound meaning that there would be no significant effects on development land during the construction phase.

Community Amenity and Severance

Community Amenity

13.4.46. During construction, there is the potential for a change in amenity value in terms of the increase in construction traffic coming in and out of the Main Compound. As such, there is the potential for nearby and residents, particularly to the west of the compound to experience impacts associated with a loss of amenity during construction.

Community Severance

13.4.47. As there are no diversions anticipated to access the Main Compound, it is not envisaged that there will be impacts on community severance as a result of the establishment of the construction compound.

Non-Motorised Users

13.4.48. As no PRoW will be temporarily closed or diverted as a result of the Main Compound there are not anticipated to be any effects on NMU.

Economy and Employment

13.4.49. As mentioned above for the Main Scheme Area, during construction there is the potential for significant effects in relation to direct, indirect and induced employment opportunities as well as through expenditure within the

local supply chain. This has the potential to result in beneficial impacts associated with the economy and employment.

13.4.50. The effects related to employment economy will be considered for the Scheme as a whole within the EIA.

HEALTH

Air Quality, Noise and Vibration, and Road Drainage and the Water Environment

13.4.51. As mentioned above, construction phase air quality, noise and vibration, and road drainage and water environment effects will be assessed as part of the EIA and will be considered in the Population and Health section in relation to human receptors, with a particular focus on vulnerable groups of people who are most likely to experience health inequality.

13.4.52. Activities within the Main Compound are likely to have an impact on human health as there is the potential for air quality, noise and vibration, road drainage and water environment effects from activities within the compound.

Vehicle Travellers

13.4.53. Vehicle users travelling to Morpeth and Felton utilising the A1 may experience increased journey times due to traffic management measures or increased presence of construction vehicles accessing the compound.

OPERATION

13.4.54. As the Main Compound will no longer be required during operation of the Scheme, it is not envisaged that there will be any impacts arising during this phase.

13.5 DESIGN, MITIGATION AND ENHANCEMENT MEASURES

13.5.1. Appropriate mitigation will be determined once the Scheme design has progressed, the scope for the Population and Health section agreed, and potential impacts can therefore be assessed fully. However, the following sections present a preliminary consideration of design, mitigation and measures.

CONSTRUCTION

13.5.2. Traffic management systems and diversion routes will be put in place to maintain access to residential and commercial properties, and potentially community facilities and recreational and open spaces (although none are currently identified as being directly affected by the construction of the Scheme). Where appropriate, access roads will be constructed / upgraded ahead of works on the main A1.

13.5.3. Best practice construction methods should be used to minimise noise, air quality and dust emissions, and emissions to or from road drainage and the water environment, and monitoring established to ensure acceptable working limits are adhered to, using best practice methods to be outlined in the CEMP.

13.5.4. The design of diversion routes for NMUs should take account of vulnerable user groups to ensure that accessibility is maintained for users with limited mobility, and that routes are clearly signposted.

13.5.5. Opportunities to mitigate impacts on NMUs or to enhance facilities for NMUs in association with the construction phase of the Scheme will be considered in conjunction with NCC and other interest groups. Please note that measures are also applicable to NMUs during the operational phase.

13.5.6. Measures should be put in place, where possible, to maximise the potential benefits associated with construction employment, including the sourcing the construction workforce and supplies for the Scheme locally. In conjunction with this, opportunities to enhance employment benefits by introducing training schemes and engaging with local employment brokers should be explored.

OPERATION

13.5.7. Where possible, routes for NMUs and vehicle travellers which provide direct access on to the A1 have been avoided as these considered to be less safe and more disruptive to traffic than providing alternative access arrangements. As such, these have been avoided wherever possible whilst still maintaining connectivity for all users.

13.6 DESCRIPTION OF THE LIKELY SIGNIFICANT EFFECTS

CONSTRUCTION

PHYSICAL ASSETS AND LAND USE

13.6.1. There is the potential for temporary significant adverse effects for those residential properties where access is restricted. However, the CEMP and Traffic Management Plan will contain measures to help mitigate these potential significant effects and ensure that residential access is maintained.

COMMUNITY AMENITY AND SEVERANCE

13.6.2. There is the potential for temporary significant adverse effects on both residential amenity and severance as a result of construction activities. The implementation of PRoW diversion routes has the potential to temporarily exacerbate existing community severance issues along the Proposed Route.

Non-Motorised Users

13.6.3. The closure and diversion of PRoW has the potential to result in temporary significant adverse effects for NMUs. The amenity and user experience of these PRoW also has the potential to be temporarily affected.

ECONOMY AND EMPLOYMENT

13.6.4. The construction of the Scheme has the potential to create temporary significant beneficial effects in relation to employment generation and the supply chain.

AIR QUALITY, NOISE AND VIBRATION, AND ROAD DRAINAGE AND THE WATER ENVIRONMENT

13.6.5. There is the potential for temporary significant adverse effects on air quality and noise sensitive receptors in close proximity to the Scheme (at this scoping stage, only residential dwellings are projected to experience significant adverse effects). Within the study area there is a slightly higher proportion of adults aged over 65 years old compared to the England average, who may be particularly sensitive to increased noise levels. This age group is also more sensitive to respiratory ailments, as well as residents in more deprived areas with limited access to healthcare facilities. In addition, there is potential for significant effects in relation to pollution of watercourses and surface water and flood risk. However, these effects are likely to be localised and temporary in nature, and would be managed through mitigation and construction management.

VEHICLE TRAVELLERS

13.6.6. There is the potential for temporary significant adverse effects on vehicle travellers as a result of driver stress due to the presence of diversions and traffic management, which could reduce peak hourly flow rates for users of the A1. Driver stress may also impact young and old drivers in particular; younger drivers may lack confidence to navigate through road works, whereas older drivers may experience physical, cognitive and sensory impairments which will limit mobility and could affect confidence.

OPERATION

AIR QUALITY, NOISE AND VIBRATION, AND ROAD DRAINAGE AND THE WATER ENVIRONMENT

13.6.7. There is the potential for permanent significant adverse effects on the physical and mental health of human receptors as a result of on-going exposure to elevated noise levels from increased traffic flows and road traffic noise. There is also the potential for changes in pollutant concentrations (notably NO_2) due to exhaust emissions from road traffic. These effects are likely to be localised in the areas within close proximity to the A1. This has the potential to have long-term adverse impacts on human health, particularly in those with underlying respiratory problems, particularly children and adults over the age of 65 and those people in more deprived areas with limited access to healthcare facilities. In addition, there is potential for significant effects in relation to pollution of watercourses and surface water and flood risk. The potential for operational impacts on Air Quality, Noise and Vibration and Road Drainage and the Water Environment chapters of the ES.

VEHICLE TRAVELLERS

13.6.8. There is the potential for permanent significant beneficial effects for vehicle travellers as a result of improvements to road safety and traffic congestion. This also has the potential to lead to reduced driver stress levels for vehicle travellers.

13.7 ASSESSMENT METHODOLOGY

TOPICS AND ELEMENTS OF TOPICS TO BE SCOPED IN AND OUT

13.7.1. The following sub-topics and elements of topics are to be **scoped out** of the Population and Health assessment:

- There is no open/green space or recreational facilities within or adjacent to the Scheme and therefore no assessment of land-take on such land uses will be undertaken within the Population and Health assessment.
- Impacts on physical assets and land use are not expected to be significant during the operation of the Scheme and therefore will not be considered in the operational phase assessment.
- Impacts on community amenity and severance are not expected to be significant during the operation of the Scheme and therefore will not be considered in the operational phase assessment.
- Impacts on the local economy and employment are not expected to be significant during the operation of the Scheme and therefore will not be considered in the in the operational phase assessment.
- Views from the road are not expected to be significantly adversely affected during construction due to the temporary nature and phasing of the construction works. During operation, it is anticipated that views from the Scheme would be similar to current views from the A1. This is due to the nature of the Scheme which primarily includes online widening to east of the existing A1. As such, effects will not be considered further within the Population and Health assessment.
- During construction and operation, it is not anticipated that there would be any significant effects on development land in relation to Main Scheme and both site compounds. As such, effects will not be considered further within the Population and Health assessment.

13.7.2. The following sub-topics and elements of topics are to be **scoped in**:

- Impacts on residential and physical assets and open space and recreational land use are anticipated to arise in relation to the impacts of the Scheme on occupiers of these properties, and users of land (during construction only). The potential impact on residential and commercial properties in relation to access and their inhabitants, and on the access and use of open space and recreational assets will be reported within the EIA and considered in relation to Human Health. These topics will form the Physical Assets and Land Use assessment.
- Impacts on community amenity and severance are anticipated to arise in relation to the ability of people to enjoy their surroundings, access local facilities, and their feelings of wellbeing. The assessment of community amenity and severance will consider the potential for effects such as reduced air quality and increased noise or loss of access to facilities to have a combined impact on communities (during both construction and operation). These topics will form the Community Amenity and Severance assessment. An assessment of human health in relation to these topics will also be undertaken as part of the Air Quality, Noise, and Vibration section of the Population and Human Health report (see below), where these aspects have a bearing on human health in relation to things like access to facilities necessary for the maintenance or enhancement of health and wellbeing, in terms of availability, accessibility, stress and safety. Additional effects in relation to these topics will be undertaken in other sections of the ES including Air Quality; Noise and Vibration; Landscape and Visual Amenity; and Materials chapters.
- Impacts on NMUs including pedestrians, cyclists and equestrians are anticipated to arise in relation to their ability to access and use PRoW and non-designated public routes, changes to the accessibility and usability of NMU routes, changes to journey lengths, and journey amenity (during both construction and operation). Impacts on NMUs will be reported within the ES and considered in relation to Human Health. These topics will form the NMU assessment.
- Impacts on the local economy and employment are anticipated to arise in relation to job creation, the supply chain, and employment opportunities for the local population (during construction only). Impacts on these topics will be reported in the ES and considered in relation to Human Health. These topics will form the Economy and Employment assessment.
- Impacts on human health in relation to air quality, noise and vibration, and road drainage and the water environment are anticipated to arise during construction and operation and will be reported in the ES. These topics will form the basis of the Human Health assessment of effects on human receptors, with a focus on identifying vulnerable groups who may experience health inequality, in relation to air quality, noise and vibration, and road drainage and the water environment.
- Impacts on vehicle travellers are anticipated to arise in relation to traffic, journey delays and congestion, traffic safety, and driver stress (during both construction and operation). Impacts on vehicle users will be

reported within the ES and considered in relation to Human Health. These topics will form the Vehicle Travellers assessment.

LEGISLATION, POLICY AND GUIDANCE

13.7.3. Legislation relevant to the Scheme will be presented in the ES and will consist of the following aspects:

- European Policy;
- National Policy; and
- Local Planning Policy.

13.7.4. The following legislation will underpin the assessment and will be described in detail in the assessment:

- The EIA Regulations2017 (**Ref 13.14**).
- The Countryside and Rights of Way Act, 2000 (**Ref 13.15**).
- Localism Act, 2011 (**Ref 13.16**).
- EIA Directive: Implementing the Requirements of 2011/92/EU as amended by 2014/52/EU, 2018 (**Ref 13.20**).

13.7.5. The following policy and guidance will underpin the assessment and will be described in detail in the assessment:

- Revised NPPF (**Ref 13.17**)
- Northumberland Local Plan Core Strategy – Consolidated documents, 2017 (**Ref 13.18**)
- Northumberland Local Plan (draft), Policy STP5 Health and Wellbeing (**Ref 13.19**)
- Highways England 'People and Communities Clarification Note, 2012 (**Ref 13.4**)
- Highways England, Design Manual for Roads and Bridges Volume 11 Section 3 Part 8 Pedestrians, Cyclists, Equestrians and Community Effects, 1993 (**Ref 13.2**)
- IAN 195/16 'Cycle Traffic and Strategic Road Network' (**Ref 13.21**)
- English Partnerships Additionality Guide (4th Edition) 2014 (**Ref 13.22**)

13.7.6. Policy and plans relevant to the Scheme will be presented at Preliminary Design Stage which will form part of the ES and will consist of the following aspects:

- A schedule of the relevant national, regional, county and local policies; and
- A commentary setting out the significance of the impact of the Scheme on each policy objective.

METHODOLOGY

13.7.7. The assessment of the likely significant effects on Population and Human Health will be undertaken in accordance with and in reference to the following:

- DMRB Vol 11 Section 3: Part 6 Land Use; Part 8 Pedestrians, Cyclists, Equestrians & Community Effects and Part 9 Vehicle Travellers; and
- Emerging technical guidance following the changes to the EIA Regulations issued in 2017.

PHYSICAL ASSETS AND LAND USE

13.7.8. A qualitative high-level desk based assessment will be carried out for the assessment of residential and commercial properties, as described in DMRB guidance within Volume 11, Section 3, Part 6 applying professional judgement, the effects related to physical assets will be described as: beneficial, negligible, or adverse; permanent or temporary; and of minor, moderate, or major significance

13.7.9. A **Simple Level** assessment of the impacts on open/green space and recreational facilities is proposed and will consider the importance of the space / facilities to its current users / the local population, the availability of alternative land within the vicinity, the proportion of land-take and the levels of open and recreational space by vulnerable groups. There is no established assessment framework outlined within DMRB guidance relating to recreational activities/the assessment of open green space. As such, the assessment will utilise the criteria in DMRB Volume 11, Section 3: Part 8. and apply professional judgement to determine the effects related to recreational activities as: beneficial, negligible, or adverse; permanent or temporary; and of minor, moderate, or major significance

COMMUNITY AMENITY AND SEVERANCE

13.7.10. Amenity is defined in the DMRB (Volume 11, Section 3, Part 6) as the relative 'pleasantness' of a journey. This encompasses, but is not limited to, changes in journey length, route and time. It takes into account a

number of other factors depending on the user. A qualitative high-level desk based assessment will be carried out for each of the elements, as described in DMRB guidance within Volume 11, Section 3, Part 6.

13.7.11. Severance relates to a person's ability to access local resources and facilities. A **Simple Level** assessment of effects on community severance during construction will also be considered in line with IAN 125/15 and DMRB Volume 11, Section 3, Part 5. Consideration of severance in relation to vulnerable groups will also be undertaken.

Non-Motorised Users

13.7.12. The methodology will be based on the procedures set out in the DMRB Volume 11, Section 3, Part 8 and 9 and the application of DMRB Volume 5, Section 2, Part 5, HD42/17, and will consider:

- The impact of the Scheme on the journeys that NMUs make in its locality;
- The impact on existing usage of PRoW by pedestrians and others; and
- Changes in safety and amenity value of PRoW which may be affected by the Scheme.

13.7.13. The assessment will be **Simple Level** and involve a desk study to identify likely NMU activity during construction, as well as how local community facilities are likely to be affected of the proposed options and the potential adverse and beneficial effects.

13.7.14. For walkers, the amenity will include footpath width, distance from traffic, barriers between pedestrians and traffic and the quality of street furniture and any planting. For cyclists there can be positive factors such as the clear signing of alternative routes and the provision of subways or cycle crossings as well as negative factors such as junctions where vehicles and cyclists are not separated. For both pedestrians and cyclists these are in addition to the degree and duration of exposure to traffic, and the impact of the road itself.

13.7.15. The level of new severance will use the criteria in DMRB Volume 11, Section 3, Part 8 which categorises severance as Slight, Moderate or Severe.

13.7.16. Many of these aspects have a bearing on human health in relation to things like access to facilities necessary for the maintenance or enhancement of health and wellbeing, in terms of availability, accessibility, stress and safety. Where human effects are identified in this and any other topic, whether significant or not, these effects will be incorporated into the cumulative effects assessment of human health.

ECONOMY AND EMPLOYMENT

13.7.17. A qualitative high-level desk based assessment (considered to be **Simple Level**) will be carried out for the local economy using publicly available data, including NOMIS and the Census 2011.

13.7.18. The anticipated number of jobs generated during the construction phase will be based upon an evaluation of the total construction cost against the average gross output per worker. This figure will be evaluated against the total number of employees in Industry Sector F (Construction) at the local and regional levels to determine the impact magnitude.

13.7.19. Generation of indirect and induced employment opportunities associated with the construction phase will be calculated using an assumed multiplier of 1.5 on the basis that the level of multiplier effects is considered to be 'medium' as there are anticipated to be 'average linkages' associated with the Scheme in accordance with the English Partnership Additionality Guide (Ref 13.22). At this stage, it is not possible to isolate the Industry Sector where the impact may occur. Therefore, these figures will be evaluated against the total number of employees in all Industry Sectors within the local and regional levels to determine the impact magnitude.

13.7.20. As there is no specific guidance within the DMRB, the impact will be described under a three-point descriptive scale as Low, Moderate or High.

HUMAN HEALTH

13.7.21. The assessment of likely significant effects on human health will be undertaken in accordance with the following:

- Air Quality: HA 207/07, IAN 185/15, IAN 175/13, IAN 174/13, IAN 170/12;
- Noise and Vibration: HD 213/11, IAN 185/15; and
- Road Drainage and The Water Environment: HD 45/17.

13.7.22. In relation to human health, the findings of these assessments, presented in other chapters of the ES, will be summarised within the Population and Human Health section and assessed in relation to the impacts that may arise on human health receptors, including the general population and particularly the following vulnerable groups:

- Children and young people;
- Older people;

- People in low income;
- Economically inactive;
- Unemployed/workless;
- Groups who suffer discrimination or other social disadvantages;
- People with physical or learning disabilities/difficulties;
- People living in areas known to exhibit poor economic and/or health indicators;
- People living in isolated areas; and
- People unable to access services and facilities.

13.7.23. The effects on human health will be identified by determining how the impacts identified affect human receptors in relation to the following aspects:

- Active travel;
- Generic accessibility and mobility;
- Access to public transport;
- Community cohesion;
- Access to healthcare facilities and services;
- Air quality and traffic related pollution;
- Natural and open green space;
- Existing biodiversity; and
- Employment and the local economy.

VEHICLE TRAVELLERS

13.7.24. Driver stress is the adverse mental and psychological effects experienced by a driver traversing a road network. Stress can induce in driver's feelings of discomfort, annoyance, frustration, or fear culminating in physical or emotional tension that detracts from the value and safety of the journey. Volume 11 Section 3 Part 9 of the DMRB indicates that with increased driver stress, a reduction in driving standards occurs, which may be expressed as an increase in aggression towards other road users, or a diminished response to visual and other stimuli.

13.7.25. The level of stress experienced by a driver may be affected by a number of factors including: road layout and geometry; surface riding characteristics; junction frequency and speed; and flow per lane. There are three main components of driver stress as follows:

- Driver frustration - caused by an inability to drive at a speed consistent with the standard of the road, and increases as speed falls in relation to expectations;
- Driver fear - the main factors are the presence of other vehicles, inadequate sight distances and the likelihood of pedestrians, particularly children, stepping into the road. Fear is highest when speeds, flows and the proportion of heavy vehicles are all high, becoming more important in adverse weather conditions; and
- Driver uncertainty - caused primarily by signing that is inadequate for the individual's purposes.

13.7.26. The measurable aspect of driver stress is associated with frustration due to delays. The level of Driver Stress will be determined in accordance with a **Simple Level** qualitative assessment, under a 3 point descriptive scale, as recommended by DMRB, Volume 11 Section 3 Part 9, as Low, Medium or High. Driver stress will also be considered in relation to vulnerable groups and how the experience of travellers may by more acute for drivers belonging to these groups.

ASSESSMENT CRITERIA

13.7.27. The assessment of potential impacts on Population and Human Health as a result of the Scheme will be undertaken for both the construction and operation phases of the Scheme. The significance level attributed to each will be assessed based on the impact magnitude and the sensitivity of the affected receptor/receiving environment due to change, as well as a number of other factors outlined in more detail in **Chapter 5 – Approach to the Assessment** of this Scoping Report.

13.7.28. Significance will be based on the combination of impact magnitude and sensitivity of the receptor and utilise the appropriate scales set out within DMRB guidance (Volume 11 Section 3 Parts 8 and 9). Where an existing scale is not set out, this will be based on professional judgement.

13.8 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

13.8.1. The assessment will rely, in part, on data provided by third parties (e.g. OS Mapping, Local Authorities, ONS) which are the most up-to-date, available at the time of the assessment. No significant changes or limitations in these datasets have been identified that would affect the robustness of the assessment for EIA purposes.

13.8.2. It is not possible on the basis of information available at this stage to determine whether there would be significant impacts on farm businesses. Further investigation into this will be undertaken to determine the impact on farm businesses.

13.8.3. The DMRB method for driver stress calculations applies only to individual road links, but is most effectively interpreted in terms of multiple links making up complete journeys through the network. However, in this case the calculated outputs could not be mapped suitably. This is due to an incompatibility between elements of the traffic data and the GIS that prevented the calculation results from being effectively mapped in a bi-directional manner. This placed a limitation on the interpretation of the driver stress calculations results in terms of full journeys through the network.

13.8.4. The assessment of NMU route amenity relies on qualitative descriptions by the assessor which are subjective. Where subjective assessments are presented, attempts to reconcile against evidence will be made throughout.

13.8.5. The assessment will resolve population impacts down to the lowest defined population group according to ONS survey outputs (lower super output areas). Where publicly available baseline health information is limited or not comparable at the ward level, data at the local authority or regional level was used to ensure consistency and allow comparison where appropriate. In some instances, comparisons on indicators between wards was not always appropriate, due to varying information coverage and reporting year of the data available.

13.8.6. Vulnerable groups have been assumed to be present throughout the study area, though where specific areas have been identified as deprived, these areas will be emphasised.

13.8.7. The assessment of health in EIA has, in the past, focussed on impacts identified through other environmental topic assessments, such as air quality or land contamination. The revised EIA regulations are interpreted as requiring a wider consideration of health impacts than this. A formal methodology for the assessment of health in EIA is yet to be prepared or adopted and there is therefore a lack of certainty about the scope of such assessments.

13.8.8. It is proposed to address this uncertainty through the application of certain aspects of Health Impact Assessment (HIA) methodology, professional expertise on the assessment of social and population impacts on road schemes, and guidance issued by the professional institute of EIA, IEMA. It should be noted that whilst HIA provides a useful steer as to what the scope of an EIA health assessment might consider, it does not constitute an assessment of health in EIA terms itself.

13.8.9. Any limitations found or assumptions used in the final assessment will be highlighted within the ES.

14 MATERIAL ASSETS AND WASTE

14.1 INTRODUCTION

14.1.1. This Chapter considers the implications of the Scheme on the consumption of materials resources (which includes recovered site arisings), and the generation and disposal of waste, during the construction and operational phases and any potential significant effects. It sets out the proposed methodology for assessment and identifies those impacts that can be scoped out of the EIA.

14.1.2. The assessment methodology to be used is based on guidance set out in Interim Advice Note (IAN) 153/11 (Highways Agency, 2011) *Environmental Assessment of Material Resources* (**Ref. 14.1**) and the subsequent guidance. IAN153/11 sets out the process and information required for the assessment of significant effects from material resources and waste.

14.1.3. Materials resources are defined in IAN 153/11 as "*the materials and construction products required for the construction, improvement and maintenance of the road network. Materials resources include primary raw materials such as aggregates and minerals, and manufactured construction products. Many material resources will originate off site, purchased as construction products, and some will arise on site such as excavated soils or recycled road planings.*"

14.1.4. IAN 153/11 does not include a definition of waste, however the EU Waste Framework Directive (**Ref. 14.2**) defines it as "*any substance or object that the holder discards or intends or is required to discard.*"

14.1.5. This Chapter should be read together with the introductory chapters of this Scoping Report (**Chapters 1 to 5**) as well as **Chapter 16 – Assessment of Cumulative Effects**.

14.2 STUDY AREA

14.2.1. The primary study area comprises the area within the Scheme boundary. The secondary study area extends to the availability of construction materials and capacity of recycling and waste management infrastructure within North East England (Northumberland, Tyne & Wear, Durham and the Tees Valley).

14.3 BASELINE CONDITIONS

14.3.1. The operation and maintenance of the current Scheme assets (excluding land within the study area that is not directly related to the Scheme e.g. existing active farmland) will require the consumption of some materials, and will generate some arisings that may need to be disposed of as waste. No new infrastructure will be required for the new compound area at Lionheart Enterprise Park, as this forms part of an ongoing development as a salting and gritting depot. However, the construction of the Main Compound will require consumption of materials for its construction.

MATERIAL RESOURCES

Materials Currently Required

14.3.2. The operation and maintenance of the current Scheme assets requires a small number of specialist components (for example, signage and steelwork for replacement barriers) as well as some bulk material (asphalt for minor re-surfacing) for routine works and repairs of the highway and ancillary infrastructure.

14.3.3. The current consumption of construction and other materials from the current operational A1 is deemed **Negligible**.

14.3.4. The Do-Minimum option (no scheme pursued) would be unlikely to change the current consumption of materials within the Scheme Footprint.

UK and Regional Perspective of Construction Materials

14.3.5. **Table 44 (Refs. 14.3, 14.4, 14.5, 14.6 and 14.7)** provides a summary of the availability of the main construction materials in North East England and the UK, as required to deliver typical highways schemes. The overview provides a context in which the assessment of impacts and significant effects from material consumption on the Scheme can be undertaken.

Table 44 Materials availability in the North East of England and the UK

Material type	Availability (2016 unless otherwise stated)	
	NORTH EAST	UK
Sand and gravel +	1.8 Mt	58.7 Mt
Permitted crushed rock *	5.4 Mt	104 Mt (2015)
Concrete blocks #	2.6 Mm^2 (2017 North)	6.8 Mm^2 (2017)
Primary aggregate *	6.3 Mt	183 Mt (2015)
Recycled and secondary aggregate *	1.3 Mt	63 Mt (2015)
Ready-mix concrete +	0.6 Mm^3 (2015)	25.2 Mm^3 (2015)
Steel +	(no data)	8 Mt
Asphalt *	0.9 Mt (2015)	26.3 Mt (2015)

stocks
+ production
* sales

14.3.6. Available data indicates that the North East has, in general, a lower availability of construction materials by comparison with other regions in England. However, the availability of construction materials typically required for highways construction schemes in the North East of England and across the UK, indicates that stocks / production / sales remain buoyant. Therefore, based on the size and nature of the Scheme and using professional judgement, the sensitivity of materials for the Scheme is therefore assessed to be **low**.

14.3.7. Note: the Northumberland Local Plan: Draft Plan for Regulation 18 Consultation (July 2018) (**Ref 14.8**) identifies over 30 mineral safeguarding areas in the wider area. None of these safeguarded areas are within or immediately adjacent to the primary study area. Furthermore, there are no known major peat resources (**Ref.14.9**) or active peat extractions (**Ref 14.10**) within the primary study area. It should be noted, however, that a localised area of peat, associated with 'South Charlton Bog', is shown on detailed geological maps to be present beneath the existing carriageway to the east of South Charlton Bog.

WASTE GENERATION AND DISPOSAL

Waste Currently Generated and Disposed Of

14.3.8. The operation and maintenance of the Scheme assets currently generates small volumes of waste from routine maintenance, in combination with littering, signage replacement, replacement of reflective road studs (cats' eyes), vegetation from verge clearance and minor barrier refurbishments. The anticipated effects of disposing of this waste are, however, deemed negligible in the context of available regional capacity.

14.3.9. At the end of 2016, the North-East landfill sites presented in **Table 45** were recorded as having remaining capacity (**Ref 14.11**)

Table 45 Landfill sites in the North-East of England

Facility name	Former planning sub region	Landfill site type	Remaining capacity end of 2016 (m3)
Port Clarence landfill Site (Haz)	Stockton on Tees	Hazardous Merchant Landfill	4,936,746
ICI NO 3 Teesport	Redcar and Cleveland	Hazardous Merchant Landfill	2,048,720

Facility name	Former planning sub region	Landfill site type	Remaining capacity end of 2016 (m3)
Bishop Middleham Quarry 2	County Durham	Inert Landfill	3,640,558
Crime Rigg Quarry	County Durham	Inert Landfill	1,930,000
Old Quarrington Quarry Landfill	County Durham	Inert Landfill	1,769,768
Marsden Quarry Landfill	South Tyneside	Inert Landfill	1,309,155
Merryshields Quarry	Northumberland	Inert Landfill	800,000
Hollings Hill Quarry Landfill	County Durham	Inert Landfill	405,026
Field House Quarry	Sunderland	Inert Landfill	382,444
Aycliffe Quarry Landfill	Sedgefield	Non Hazardous Landfill With SNRHW cell	2,064,587
Ellington Road Landfill Site	Wansbeck	Non Hazardous Landfill with SNRHW cell	1,219,705
Seaton Meadows	Hartlepool	Non Hazardous Landfill with SNRHW cell	1,000,402
Blaydon Quarry Landfill Site	Gateshead	Non Hazardous	2,131,700
Joint Stocks Landfill Phase 2	Durham City	Non Hazardous	1,700,000
Houghton-Le-Spring Landfill Site	Sunderland	Non Hazardous	1,597,924
Path Head Landfill Site	Gateshead	Non Hazardous	1,536,249
ICI NO 2 Teesport	Redcar and Cleveland	Non Hazardous	1,512,326
Cowpen Bewley Landfill	Stockton on Tees	Non Hazardous	1,488,028
Port Clarence Non-Hazardous Landfill Site	Stockton on Tees	Non Hazardous	313,153
Springwell Quarry	Sunderland	Non Hazardous	216,846
Coatham Stob Quarry (Area 6)	Stockton on Tees	Non Hazardous	164,172
CLE 3/8 Landfill Site	Redcar and Cleveland	Non Hazardous	83,961
Alcan Ash Lagoons 1-4	Wansbeck	Non Hazardous	15,500
Total Capacity			32,266,970

14.3.10. Environment Agency data (**Ref 14.12**) confirm that at the end of 2016, 26 landfill sites in the North East were recorded as having 32.3 Mm^3 of remaining capacity. This is split into the following capacities by waste type (**Table 46)**. The change in capacity from 2015 to 2016 is also shown.

Table 46 Remaining landfill capacity in North East England

Landfill type	Capacity in 2015(m^3)	Remaining capacity m^3 (2016)	2015 to 2016 capacity comparison (m^3)
Hazardous (merchant and restricted)	6,886,815	6,985,466	0.1 Mm^3 up
Inert	10,784,968	10,236,951	0.6 Mm^3 down
Non-hazardous (including stable hazardous waste cells)	17,196,155	15,044,553	2 Mm^3 down
Total	**34,867,938**	**32,266,970**	**2.5 Mm^3 down**

14.3.11. Using the most up to date information available, the baseline regional landfill capacity is detailed in **Figure 1**. Simple statistical forecasting (Microsoft Excel forecasting function) has been used to demonstrate long-term void capacity to the year of planned Scheme completion (2023) in the absence of future provision.

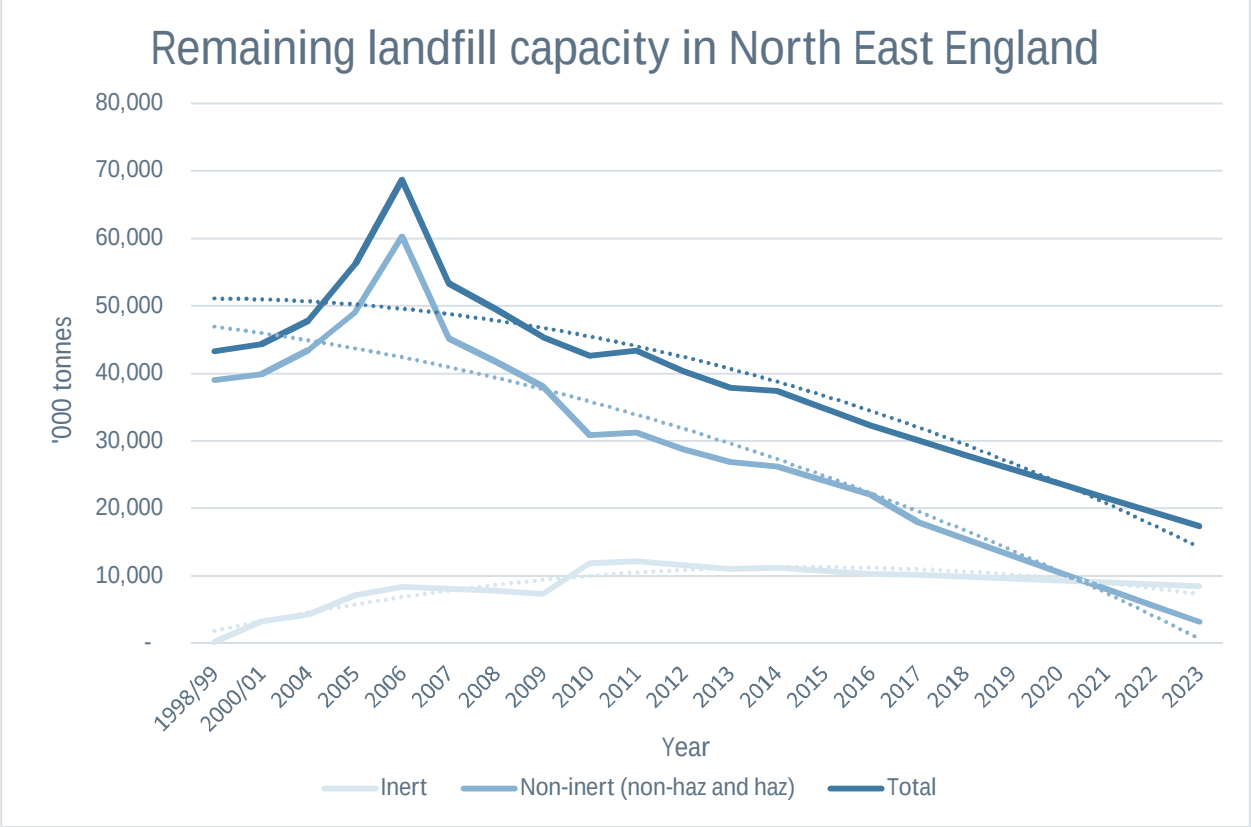

Figure 1 North East England Remaining Landfill Capacity (2000/1-2022/3)

14.3.12. Baseline data indicates that total and non-inert landfill capacity is likely to become an increasingly sensitive receptor over the life of the Scheme to the first full year of operation (2023). Simple forecasting indicates that, by comparison with 2016 data and in the absence of future provision, inert capacity may fall by as much as 18%, non-inert capacity by 85%, and total capacity by 46%.

14.3.13. Individually, the sensitivities of different landfill capacity types over the lifetime of the Scheme are assessed to be low for inert, very high for non-inert and high for total. Therefore, based on the size and nature of the

Scheme and using professional judgement, the sensitivity of landfill capacity on average is assessed to be **medium**.

14.3.14. Current routine operation and maintenance works on the Scheme assets generate negligible volumes of site arisings.

14.3.15. The Do-Minimum option (no scheme pursued) would be unlikely to change the current generation of site arisings within the Scheme Footprint.

National and Regional Perspective: Transfer, Recovery and Recycling

14.3.16. Defra data (**Table 47)** show that within England, the recovery rate for non-hazardous construction and demolition arisings have remained above 90% since 2010. This exceeds the EU target of 70%, which the UK must meet by 2020 (**Ref 14.13**).

Table 47 Non-hazardous construction and demolition arisings recovery in England

Year	Generation (mt)	Recovery (mt)	Recovery rate (%)
2010	43.9	39.7	90.5%
2011	44.1	39.9	90.6%
2012	45.3	41.3	91.1%
2013	46.3	42.1	91.1%
2014	49.1	44.9	91.4%

14.3.17. No regional data for construction, demolition and excavation production or recovery rates are currently available for the north east of England. Instead, data in **Figure 2** has been collated to show that rates of material transfer (non-civic), recovery and metal recycling within the North-East of England have risen steadily over the past 16 years. Data provided reflect the recovery of all potential waste types in the region and hence will include, but are not specific to, construction, demolition and excavation arisings.

14.3.18. Available data demonstrate that transfer, recovery and metal recycling shows a general, consistent and upward trend within the North East. Data also show that there is likely to be regional infrastructure and capacity for the transfer and recovery for Construction, Demolition, and Excavation (CDE) arisings from the Scheme. Construction and demolition recovery trends across England (**Table 45)** demonstrate further capacity in this context.

14.3.19. During demolition, enabling and earthworks, and construction, it is expected that a proportion of any waste generated will be suitable for recovery (processing, reuse or recycling) at a suitably licensed facility (off-site). Excavated and other materials that comply with an appropriate waste exemption, or reuse criteria set out in the Contaminated Land: Applications in Real Environments (CL:AIRE) Definition of Waste Code of Practice) (**Ref 14.14**) are expected to be reused on the scheme.

14.3.20. The availability of materials recovery infrastructure in the North East, and across England, suggests that there is strong potential to divert from landfill site arisings generated by the Scheme. Both the importance (positive value) of materials transfer and recovery infrastructure and the potential to maximise the re-use / recycling value of site arisings, are assessed to be positive and high.

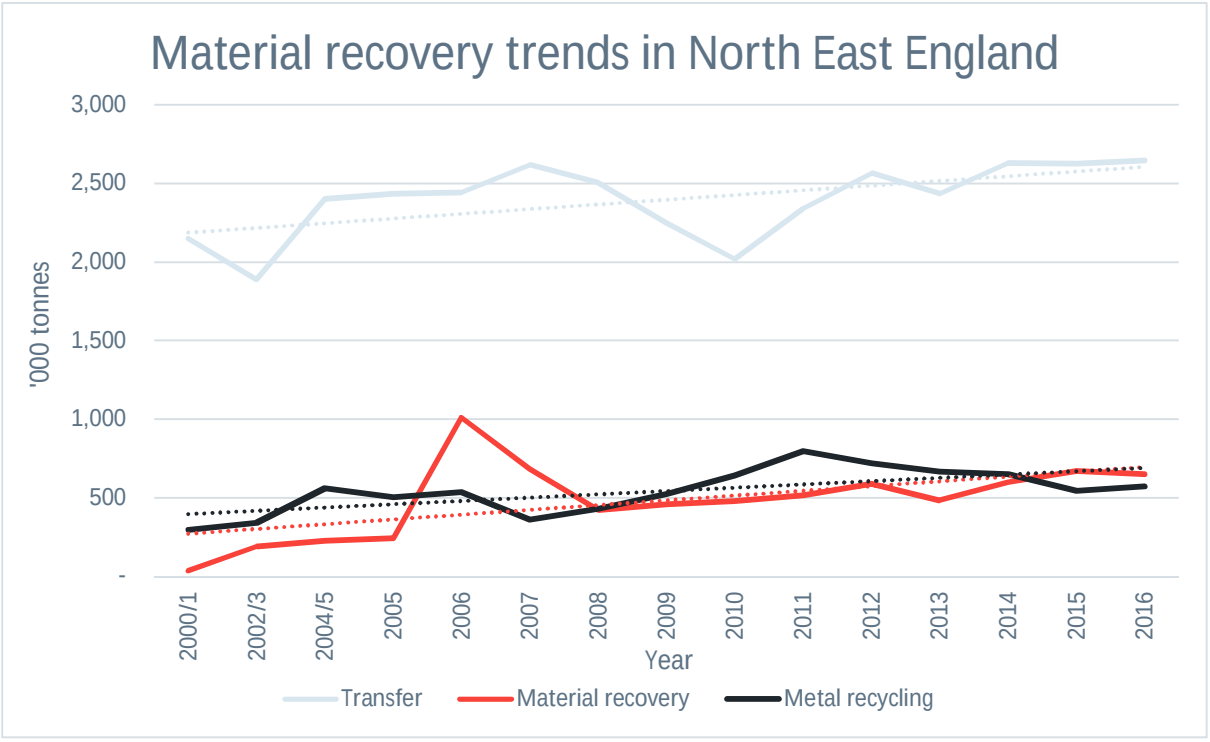

Figure 2 Transfer, material recovery and metal recycling in the North East of England

14.4 POTENTIAL IMPACTS

14.4.1. The Scheme has the potential to consume a range of material resources, including those that are generated and recovered by on-site activities. The Scheme also has the potential to produce and dispose of waste during the demolition, site preparation, and construction of the carriageways and associated infrastructure.

14.4.2. The associated potential environmental impacts (both direct and indirect) will occur principally during construction, and potentially in the first year of operation.

14.4.3. The effects associated with the described impacts include those associated with the production, processing, consumption and disposal of material resources.

14.4.4. The effects of the Scheme from material resources (including the potential re-use of materials generated during on site activities) and waste generation and disposal, are likely to occur on-site, off-site within the UK and, potentially, internationally.

14.4.5. It is important to note that impacts and effects as a result of the transportation of material resources and waste to and from site will not be assessed within the material resources chapter. Instead, they will be considered in the **Chapter 6 - Air Quality, Chapter 7 - Noise and Vibration, Chapter 11 - Road Drainage and Water Environment, Chapter 13 - Population and Health** as well as **Chapter 15 - Climate**, as appropriate to these specialist topics. Issues of contamination and resource sterilisation are discussed in the **Chapter 12 - Geology and Soils.**

14.5 DESIGN, MITIGATION AND ENHANCEMENT MEASURES

14.5.1. Specific design, mitigation and enhancement measures to avoid and mitigate adverse impacts from materials consumption and the generation and disposal of waste, and to encourage beneficial outcomes from the recovery and reuse of site arisings, may include those set out in **Table 48.**

14.5.2. Measures that have (or will be) adopted will be identified during this Preliminary Design Stage.

Table 48 Potential design, mitigation and enhancement measures

Project activity	Enhancement and mitigation measures	Lifecycle stages in which measures will be applied	Monitoring
Materials	▪ Identification and specification of materials that can be acquired responsibly, in accordance with BES 6001 Responsible Sourcing of Construction Products. (**Ref 14.15**)	Design, construction	▪ Incorporate on engineering plans configurations and layouts that show how the most effective use of materials can be achieved. ▪ Maintain records of materials that were acquired in accordance with BES 6001 Responsible Sourcing of Construction Products.
	▪ Design for resource optimisation: simplifying layout and form, using standard sizes, balancing cut and fill, maximising the use of renewable materials, and materials with recycled or secondary content, and setting net importation as a scheme goal.	Design	
	▪ Design for off-site construction: maximising the use of pre-fabricated structures and components, encouraging a process of assembly rather than construction	Design	
	▪ Design for the future: considering how materials can be designed to be more easily adapted over an asset lifetime, and how deconstructability and demountability of elements can be maximised at end-of-first-life.	Design	
Site arisings	▪ Design for recovery and reuse: identifying, securing and using materials at their highest value, whether they already exist on site, or are sourced from other schemes.	Design	▪ Incorporate on engineering plans configurations and layouts that show how the most effective use of site arisings can be achieved. ▪ Implement a regime of comparing and contrasting data on site arisings in a Design Site Waste Management Plan (forecast), with construction data (actuals)
	▪ Identify opportunities to minimise the export and import of materials.	Design, construction	
	▪ Working to a proximity principle, ensuring arisings generated are handled, stored, managed and re-used or recycled as close as possible to the point of origin.	Design, construction	
	▪ Forecast and identify the volume and type of trees and potential woodland as well as other vegetative arisings that will be generated, and establish opportunities for high value re-use and recycling, both on and off site.	Design, construction	
	▪ Identify areas for stockpiling and storing arisings that will minimise quality degradation and leachate, and will minimise damage and loss.	Design, construction	

Project activity	Enhancement and mitigation measures	Lifecycle stages in which measures will be applied	Monitoring
	▪ Ensure potential arisings and waste are properly characterised before or during design, to maximise the potential for highest value reuse.	Design	
	▪ Capture information and data on site arisings recovered and diverted from landfill, by developing a Design Site Waste Management Plan once a preferred option has been selected.	Design	
	▪ Implement a Materials Management Plan in accordance with the CL:AIRE Definition of Waste: Code of Practice.	Construction	
Waste to landfill	▪ Engage early with contractors to identify possible enhancement and mitigation measures, and to identify opportunities to reduce waste through collaboration and regional synergies.	Design, Procurement	▪ Implement a regime of comparing and contrasting data on waste in a Design Site Waste Management Plan (forecast), with construction data (actuals)
	▪ Capture information and data on waste sent to landfill, by developing a Design Site Waste Management Plan once a preferred option has been selected.	Design	

14.5.3. It is anticipated that, with the implementation of effective design mitigation measures, including designing out waste, and effective implementation of measures set out within a CEMP, SWMP and MMP, that there would be no significant residual effects associated with material resources.

14.6 DESCRIPTION OF LIKELY SIGNIFICANT EFFECTS

14.6.1. A summary of the likely significant effects for material resources consumption and waste generation and disposal is provided in **Table 49.** Where appropriate, the potential influence of recovering and reusing / recycling site arisings is also included.

14.6.2. Due to the scale and nature of the Scheme, a **Detailed Level** assessment will be completed, as part of the EIA.

Table 49 Likely Significant impacts of consuming material resources and disposing of waste

Element	Use of material resources	Production and disposal of waste
Demolition	**No likely significant impacts identified with regards to material resources use during demolition.**	Wastes generated during demolition are likely to include: ▪ broken out concrete, cut steel and road surface planings; ▪ hazardous or contaminated material found on or beneath the Scheme; and ▪ other demolition wastes. Waste in this phase of the works would be produced during the breaking out of parts of the proposed 8 km

		online highway, concrete crash barriers, areas of the central reserve, and (potentially) in the closure of the existing direct accesses onto the A1 from a number of properties and businesses on both sides of the A1 and the construction of new access tracks linking to the upgraded junction of the B6341 and B6347 to form a compact grade separated junction. As far as possible, arisings from demolition will be reused and / or recycled on or off site. Where diverting site arisings from landfill is not possible, the impacts associated with disposing of waste would be adverse, permanent and direct. The potential for significant effects from waste disposal is associated with the commensurate reduction in landfill capacity. Landfill capacity is increasingly considered a sensitive receptor in the UK. The demolition of highway and associated assets is likely to result in a considerable volume of arisings, a proportion of which (after the potential for reuse and recycling has been maximised) may need to be disposed of. **Where demolition waste needs to be disposed of, and in combination with other on-site phases, there are likely significant adverse effects.**
Site remediation and preparation	The following material resources are expected to be consumed as part of the site remediation and preparation phase: ▪ timber and other products required for the erection of perimeter fencing and temporary barriers; and ▪ aggregate and stone for ground improvement at site, prior to use by heavy plant and equipment. Any impacts associated with material resource consumption would be adverse, permanent and direct. **It is likely that the Scheme will generate significant adverse effects from material resource consumption during site remediation and preparation.**	Wastes likely to be generated during site preparation include: ▪ vegetation (potentially, including invasive weeds) and other above ground materials produced by site clearance; ▪ surplus topsoil or subsoil material; and ▪ hazardous or contaminated material found on or beneath the Scheme. The presence or extent of any hazardous or contaminated substances is currently unknown, but will be informed by Ground Investigation. The potential for waste to be produced and disposed of during site preparation works is potentially considerable. Any impacts would be adverse, permanent and direct. Some impacts may be precluded where arisings (e.g. top soil and sub soil) can be reused. **It is likely that the Scheme will generate likely significant adverse effects from site remediation and / or preparation.**
Scheme construction	Material resources will be required for the construction of the Scheme, including (but not limited to): the 8 km online highway; replacement of the existing at-grade junction at Charlton Mires with a compact grade separated junction; the existing accesses onto the A1 at this location would be stopped up with private means of access being provided as appropriate; an accommodation bridge at Broxfield,	Waste is anticipated to be generated during the construction of the Scheme, particularly during the construction of new lanes, structures and associated assets. It is anticipated that the following wastes would be generated: ▪ Timber from formwork and fencing; ▪ Concrete, bricks and aggregate waste;

	spanning the mainline and providing access for vehicles and vulnerable road users. Additional key design features include the provision of parking lay-bys, bus lay-bys, attenuation ponds, additional culverts as well as the extension of existing culverts, to be included in the scheme design where appropriate. Utilities would also need to be diverted as part of the Scheme. Construction materials required are anticipated to include: ▪ Bulk materials for earthworks (volumes will be dependent on the cut and fill balance); ▪ Road paving materials, including sub-base and bituminous materials; ▪ Steel – for structures, sheet piling and fencing; ▪ Concrete including for pre-cast and prefabricated elements; ▪ Bricks and aggregate; ▪ Timber for fencing and formwork; ▪ New street furniture and signage; ▪ Cabling; and ▪ Other general construction materials. The volumes of material resources required for the Scheme will be identified and assessed during this Preliminary Design Stage. Volumes of bulk earthworks, road paving, steel, concrete and aggregate are expected to be significant. The main impacts as a result of the use of material resources are the consumption of natural resources. Impacts would be considered adverse, direct and permanent, and would result in the following effects: ▪ depletion of natural resources and local / regional stocks; and ▪ degradation of the natural environment. **Based on the scale and nature of the works i.e. major improvement to an existing highway and other major changes to the network, it is anticipated that the consumption of material resources is likely to have significant adverse effects.**	▪ Road paving materials including sub-base and bituminous materials; ▪ Hazardous or contaminated material found or generated on site; ▪ Surplus cabling; ▪ Redundant street furniture and signage; ▪ Steel waste e.g. safety barriers; and ▪ General construction waste e.g. packaging, ducting, damaged goods. The volumes of waste likely to be generated and disposed of as result of the Scheme will be identified and assessed during this Preliminary Design Stage. Impacts as a result of waste generation would be adverse and direct, and are generally accepted to be permanent in nature. The resultant adverse effects would be a reduction in landfill void capacity. As far as possible, all site arisings (with the potential to become waste) would be targeted for reuse or recycling either on, or off, the Scheme. Where this is not possible, disposal is likely to be required. **Based on the scale and nature of the works, it is anticipated that there are likely significant adverse effects from the generation and disposal of waste.**
Operation and maintenance of asset	In the first year of operation, minor amendments and changes to the Scheme assets may be required. Depending on the extent of these changes, the potential to consume material resources (including recovered site arisings), and produce and dispose of waste may be required. Where these changes can be forecast for the first year of operation, they will be included in the environmental assessment. **The extent of changes within the first year of operation is not currently known, but professional judgement would indicate that there are unlikely to be significant effects.**	

14.7 ASSESSMENT METHODOLOGY

TOPICS AND ELEMENTS OF TOPICS TO BE SCOPED IN AND OUT

14.7.1. The following elements have been **scoped out** of the EIA:

- Lifecycle assessment (including embodied carbon and water) of materials and site arisings, and waste. The effort and resources required to undertake a full lifecycle assessment of these elements are deemed disproportionate to the benefit they would offer the assessment of significance of effect.
- The consumption of material resources, and site arisings and waste production beyond the first year of scheme operation have been **scoped out**, as their impacts and associated effects have been deemed to be not significant.

14.7.2. The following topics have been **scoped in** to the EIA:

- The consumption of material resources (from primary, recycled or secondary, and renewable sources, and including products offering sustainability benefits) including the generation and use of arisings (which have been proven not to be waste, through exemption or application of a MMP) recovered from Site during construction only; and
- The production and disposal of waste to landfill.

LEGISLATION, POLICY AND GUIDANCE

UK Legislative Acts

14.7.3. The following legislative instruments in the UK govern the storage, collection, treatment and disposal of waste:

- The Control of Pollution Act 1974;
- Environmental Protection Act 1990;
- Waste Minimisation Act 1998;
- The Clean Neighbourhoods and Environment Act 2005; and
- Finance Act 2018.

Regulations applicable in England

14.7.4. The following regulations govern the storage, collection, treatment and disposal of waste in England:

- Hazardous Waste (England and Wales) Regulations 2005;
- The Waste (England and Wales) Regulations 2011; and
- The Controlled Waste (England and Wales) Regulations 2012.

National Policy Documents

14.7.5. The following national policy documents provide a context and strategic basis for the storage, collection, treatment and disposal of waste in the UK:

- National Planning Policy for Waste (2014) (**Ref 14.16**);
- NPS NN (2014) (**Ref 14.17**);
- Waste Management Plan for England (2013) (**Ref 14.18**);
- National Policy Statement for Hazardous Waste (2013) (**Ref 14.19**); and
- Northumberland Local Plan: Draft Plan for Regulation 18 Consultation (July 2018) (**Ref 14.8**).

14.7.6. Policy and plans relevant to the Scheme will be presented at Preliminary Design Stage which will form part of the ES and will consist of the following aspects:

- A schedule of the relevant national, regional, county and local policies; and
- A commentary setting out the significance of the impact of the Scheme on each policy objective.

METHODOLOGY

14.7.7. The primary guidance that will be used to inform the assessment process is IAN153/11 Environmental Assessment of Material Resources.

14.7.8. As the proposed works comprise road widening and improvements, the replacement of the at-grade junction at Charlton Mires with a compact grade separated junction and the construction of the bridge at Broxfield, spanning the main line, the Scheme meets the IAN153/11 guidance definition of 'complex improvement and large new construction works'. In accordance with the requirements for complex works set out in the guidance, a **Detailed Level** assessment of material resources shall be undertaken.

14.7.9. As part of the **Detailed Level** assessment, the following assessment tasks will be carried out:

a) relevant waste legislation, policies and guidance will be reviewed to identify material use and waste management objectives, commitments and targets;

b) the likely types of material resources (including site arisings) and waste will be identified, and quantities estimated for the Scheme; for waste, inert and non-inert forecasts will be made;

c) impacts will be evaluated against the regional and national materials markets and the capacity of regional (or if appropriate, national) waste management infrastructure;

d) opportunities to eliminate, reduce, re-use, recycle or recover material resources, site arisings and (potential) waste, will be identified through a review of the Scheme (including proposed building materials, construction methods and design, where available) and in accordance with industry best practice; and

e) identification of viable circular economy opportunities in design will be made.

14.7.10. The ES will take into account the nature of impacts (adverse / beneficial, permanent / temporary, direct / indirect) from material resources. Significance of effects will be determined using IAN 153/11 whilst also taking into account the requirements of the NPS NN (2014).

14.7.11. The main outputs from the **Detailed Level** assessment will be:

a) the identification of the environmental impacts and the significance of effects associated with material resources (including site arisings) and waste; and

b) the measures which will be implemented to eliminate or mitigate impacts, and to fulfil resource efficiency and circular economy opportunities.

14.7.12. Assessment results will be presented in Table C of Annex 2 (Detailed Assessment Reporting Matrix) as set out in IAN 153/11.

METHOD OF BASELINE DATA COLLECTION

14.7.13. The baseline data collected and presented in the ES will be obtained by desk study.

14.7.14. The data acquired during the desk study will describe the regional and national availability of materials that would typically be required for the Scheme, and the capacity of regional facilities to recover and dispose of waste generated.

14.7.15. Data relating to the volumes of materials, their source and recycled content and volumes of waste their disposal method will be obtained from design estimates, and information provided from the principal contractor.

ASSESSMENT CRITERIA

Materials

14.7.16. An assessment of the effects of consuming materials required during site construction (to 2024), will be undertaken by considering the origins and sources of materials, including their general availability (production, stock, sales) and the proportion of recovered (reused or recycled) materials they contain.

14.7.17. The reuse of excavated and other arisings (through the application of exemption criteria) will be evaluated as part of the assessment of materials, to determine whether the adverse effects associated with the consumption of primary resources can be reduced.

14.7.18. The assessment will consider the forecast volumes of materials that need to be consumed. As IAN 153 /11 provides no stipulated thresholds for sensitivity or magnitude of impact from materials, the basis for assessment will be determined by evaluating the materials required for the scheme against the significance criteria outlined in Highways England's preferred method and set out in Column 2 of **Table 50**.

14.7.19. The assessment will also consider the nature of impacts (adverse / beneficial, permanent / temporary, direct / indirect) from materials, and use professional judgement to determine the significance of effect.

Landfill Capacity

14.7.20. An assessment of the remaining landfill capacity in the North-East of England will be used to determine the impacts and effects of waste generated during construction of the Scheme.

14.7.21. The assessment shall consider the volume of waste to be generated by the Scheme and determine the potential impact of each on remaining landfill capacity in the region; this will be completed for inert, non-hazardous and hazardous waste types. Wherever (non-exempt) waste is subsequently recovered (diverted from landfill) the influence of this action(s) will be considered in the assessment of significance of effect.

14.7.22. As IAN 153 /11 provides no stipulated thresholds for sensitivity or magnitude of impact from waste. The basis for assessment will be determined by evaluating the waste required for the scheme against the significance criteria and be based on professional judgement and existing best practice. These are set out in column 3 of **Table 50**.

14.7.23. The assessment will take into account the nature of impacts (adverse / beneficial, permanent / temporary, direct / indirect) from waste generated and disposed of, and use professional judgement to determine the significance of effect.

Table 50 Significance Criteria Materials and Waste

Significance	Materials	Waste
NEUTRAL	**Sensitivity & Magnitude** ▪ No reduction or alteration in the availability of material assets at a regional scale in relation to the resources the project will use	**Sensitivity & Magnitude** ▪ No reduction or alteration in the capacity of waste infrastructure at a regional scale
SLIGHT	**Sensitivity** ▪ comprises re-used/recycled aggregate (alternative materials) above the higher of the relevant regional or national percentage target (refer to Notes below) ▪ are forecast (through trend analysis and other information) to be generally free from known issues regarding supply and stock ▪ offer sustainable features and benefits compared to traditional materials **Magnitude** ▪ requires ≤50% of primary materials to be sourced nationally (with other primary materials sourced at a lower geographic scale)	**Sensitivity** ▪ waste infrastructure has sufficient capacity to accommodate waste from the scheme, without compromising integrity of the receiving infrastructure (design life or capacity) within the region **Magnitude** ▪ ≤1% reduction or alteration in the regional capacity of waste infrastructure
MODERATE	**Sensitivity** ▪ comprises re-used/recycled aggregate (alternative materials) below the lower of the relevant regional or national percentage target (refer to Notes below) ▪ are forecast (through trend analysis and other information) to suffer from some potential issues regarding supply and stock ▪ offer some sustainable features and benefits compared to traditional materials **Magnitude** ▪ >50% of primary materials to be sourced nationally (with other primary materials sourced at a lower geographic scale)	**Sensitivity** ▪ 1-50% of project waste requires disposal outside of the region **Magnitude** ▪ >1% reduction or alteration in the regional capacity of waste infrastructure as a result of accommodating waste from a project
LARGE	**Sensitivity** ▪ comprises no re-used/recycled aggregate (alternative materials) ▪ are forecast (through trend analysis and other information) to suffer from known issues regarding supply and stock or are known to be insufficient regarding supply and stock ▪ offer little or no sustainable features and benefits compared to traditional materials **Magnitude** ▪ >50% of primary materials to be sourced internationally	**Sensitivity** ▪ >50% of project waste requires disposal outside of the region **Magnitude** ▪ >1% reduction or alteration in the regional capacity of waste infrastructure as a result of accommodating waste from a project

Significance	Materials	Waste
	▪ sterilises ≥1 mineral safeguarding site and/or peat resource	
VERY LARGE	**Sensitivity & Magnitude** ▪ (Refer to criteria for large category)	**Sensitivity** ▪ the project would require new (permanent) waste infrastructure to be constructed to accommodate waste. **Magnitude** ▪ >1% reduction or alteration in national capacity of waste infrastructure, as a result of accommodating waste from a project
NOTES	**Recycled aggregate targets 2005 – 2020 (Ref 14.20)** The higher target for recycled aggregate between the national average or region shall apply. Where a project is located in more than one region, the regions target where the majority of the materials are to be sourced shall apply.	

Region	Recycled content target (alternative materials)	Total aggregate provision (million tonnes)
South East	26%	502
London	48%	197
East	31%	382
East Midlands	14%	784
West Midlands	27%	370
South West	22%	656
North West	30%	392
Yorkshire & the Humber	31%	431
North East	26%	193
England Average	**25%**	**3908**

14.7.24. The descriptions provided in **Table 51** will be used to define the significance of the effects identified.

Table 51 Descriptions for Significance of Effect

Significance Criteria	Materials Significance of Effect	Waste Significance of Effect
NEUTRAL	▪ Not significant	▪ Not significant
SLIGHT	▪ Not significant	▪ Not significant
MODERATE	▪ Not significant	▪ Significant
LARGE	▪ Significant	▪ Significant
VERY LARGE	▪ Significant	▪ Significant

14.8 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

ASSUMPTIONS

14.8.1. The Chapter has assumed that all third-party data used to generate the baseline is fit for purpose, and accurately reflects the current status of materials and waste in England, mindful of the below limitations.

LIMITATIONS

14.8.2. Baseline data and information for the assessment are (unless otherwise stated) only available to 2016.

14.8.3. UK landfill operators can claim commercial confidentiality for their data at time of submission; data for sites with a commercial confidentiality in place are therefore unavailable for the analyses presented in this Chapter. It is not anticipated that the lack of data in this context will significantly affect the results of the assessment.

14.8.4. Defra has been consulted to determine whether generation and recovery rates for CDE arisings were available by region.

14.8.5. Defra confirmed that it does not publish CDE figures at a regional level, and only national (England) data are accessible through the publicly available Waste Data Interrogator Database (**Ref 14.21**); the database is held and operated by the Environment Agency. It was quoted that:

14.8.6. *"The methodology used to generate these figures is complex, in order to take into account the inherent double-counting and data gaps that are present within waste system data, and it would not be feasible to reproduce these on a regional basis."*

14.8.7. Until such a time that CDE generation and recovery rates by region are available, transfer (non-civic), recovery and metal recycling data (available through the Waste Data Interrogator Database) will be used as the closest possible proxy.

15 CLIMATE

15.1 INTRODUCTION

15.1.1. This Chapter considers the implications of the Scheme on climate throughout the lifecycle of the Scheme and any potentially significant effects. It sets out the proposed assessment methodology for climate and identifies the impacts that will be scoped in or out of the EIA.

15.1.2. There are two elements to the assessment of climate:

- Effects on climate (greenhouse gas emissions); and
- Vulnerability of the project to climate change (and impacts relevant to adaptation).

15.1.3. This Chapter has been developed based on information from the Options Selection Stage EAR and design. It should be read together with the introductory chapters of this Scoping Report (**Chapters 1 -5)** as well as **Chapter 16 – Assessment of Cumulative Effects**.

15.2 STUDY AREA

GREENHOUSE GAS EMISSIONS

15.2.1. The GHG assessment is not restricted by geographical area but instead includes any increase or decrease in emissions as a result of the Scheme, throughout its design life. This includes:

- Construction - for construction carbon the study area principally takes account of emissions associated with Scheme activities and their associated transport; and
- Operational - the study area for the traffic element of the operational GHG emissions assessment will be based on the ARN. The study area for operational replacement will take account of resurfacing activities as outlined for construction.

RESILIENCE

15.2.2. The assessment of vulnerability of the proposed Scheme to the impacts of climate change will be informed by regional scale information on historic and projected change in climate variables. The UK Climate Projections 2009 (UKCP09) provide data on projected change in climate variables for each of the administrative regions of the UK. The proposed Scheme falls within the North-East England region so this boundary will form the study area for the vulnerability assessment.

15.3 BASELINE CONDITIONS

GREENHOUSE GAS EMISSIONS

15.3.1. In the baseline (do nothing) scenario, GHG emissions occur constantly and widely as a result of human and natural activity including energy consumption (fuel, power), industrial processes, land use and land use change. The GHG assessment will only consider where the Scheme results in additional or avoided emissions in comparison to the baseline scenario and its assumed evolution.

15.3.2. The total end-user GHG emissions from traffic flows in the ‘do nothing’ (baseline) scenario are modelled as part of the air quality assessments (in accordance with the DMRB, Volume 11, Section 3, Part 1 Air Quality; HA 207/07) (**Ref 15.1**). The modelling includes the total GHG emissions for all traffic using the strategic and local road network (covered by the traffic model) in the area of the Scheme and its surrounding region. At present, data for the end-user emissions is not available for inclusion in the baseline conditions, this data will be available within the ES.

15.3.3. The operation and management of the current Scheme assets is likely to require a small number of volume specialist components (for example signage) as well as some bulk material (cement, concrete, sand and gravel) for minor works and repairs of the highway and ancillary infrastructure. These components will have embodied emissions associated with them, and the installation of them will result in emissions due to the transport of these materials, and plant use. These baseline emissions are expected to be small, and as such will not be quantified.

RESILIENCE

15.3.4. This section considers the exposure of the proposed Scheme to current climate and climate change / changes in extreme weather.

Current climate

15.3.5. The proposed Scheme is located in the North East of England. The climate of the north-east is relatively warm and temperate, although rainfall is significant, even in the driest month (typically February in Tynemouth). The climate is defined as Cfb, as described according to the Koppen-Geiger climate classification, such that:

- Temperature of the warmest month is ≥10 °C, and temperature of coldest month <18 °C but >–3 °C;
- Precipitation is more evenly distributed throughout the year; and
- The temperature of the warmest month has an average mean daily temperature of <22 °C.

15.3.6. Information on long term average observed climate variables over the period 1980 – 2010 is presented below. This information is taken from the UKCP09 report, The Climate of the United Kingdom and Observed Trends (**Ref 15.2**) and Met Office regional climate profile for North East England (**Ref 15.3**).

Temperature

15.3.7. **Figure 3** shows the long-term average mean monthly temperature for the North East of England region between 1980 and 2010. The mean annual temperature over the region varies from around 8.5 °C to just over 10 °C (**Ref 15.3**).

15.3.8. January is usually the coldest month in the region. The lowest known temperature recorded in the region was minus 21.1° C on 5 January 1941 at Houghall, a pronounced 'frost hollow' in the Wear valley near Durham. July and August are the warmest months. Extreme maximum temperatures can occur in July or August, but are less common in NE England than areas further south. However, one example was the heat wave of 3 - 4 August 1990 when temperatures of 33° C occurred widely (**Ref 15.3**).

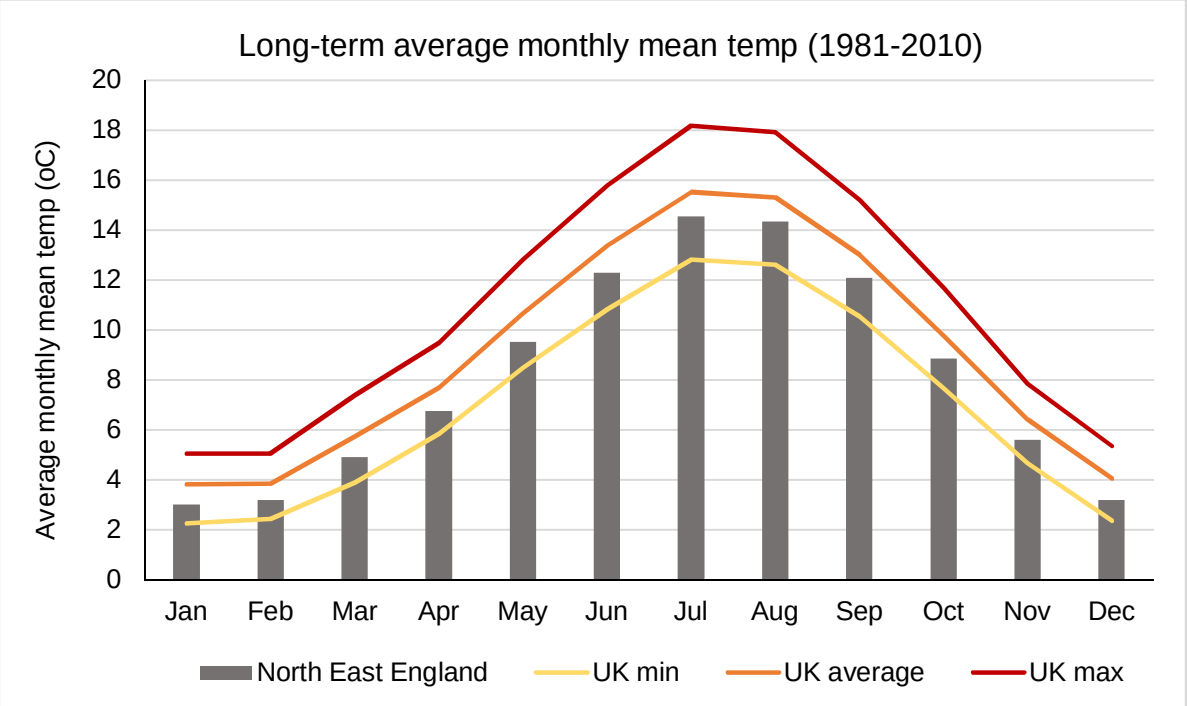

Figure 3 Long term average mean monthly temperature

Precipitation

15.3.9. **Figure 4** shows the change in long term average monthly rainfall for the North East of England region between 1981 and 2010 (compared to a 1961 – 1990 baseline). Over much of the region, the number of rain days (rainfall greater than 1 mm) tends to follow a pattern similar to the monthly rainfall totals. In the lower parts of the region, closer to the coast, there are about 30 rain days in winter and about 25 days in summer (**Ref 15.3**).

15.3.10. Periods of prolonged rainfall in the region are often associated with east or NE winds on the northern flank of depressions passing to the south of the area.

15.3.11. Thunderstorms in the region are most likely to occur from May to September, reaching their peak in July and August, but are less frequent than in areas further south, and the north of the region can expect only 5 to 8 days with thunder each year. The heaviest falls of rain in the UK are often associated with these summer thunderstorms; examples from the North East region including a storm on the 28th June 2012 which caused considerable flooding in the Newcastle area (**Ref 15.3**).

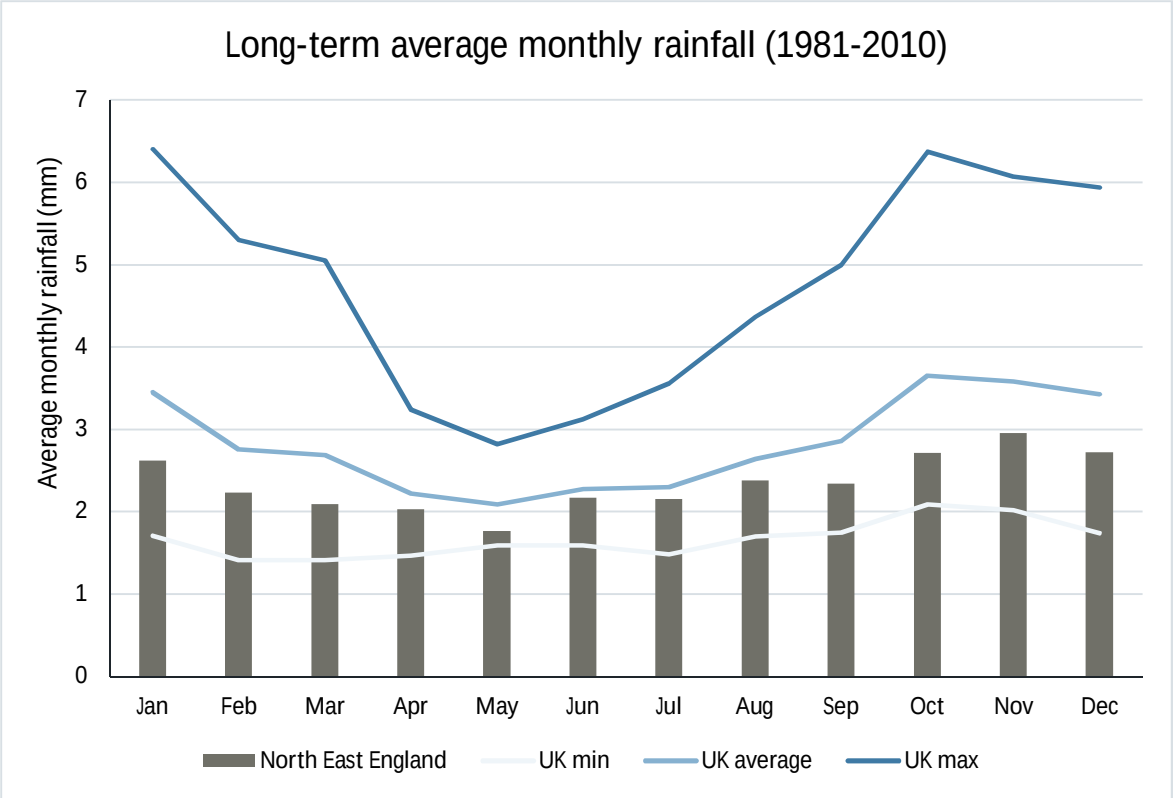

Figure 4 Change in long term average mean monthly rainfall

15.3.12. The occurrence of snow is linked closely with temperature, with falls rarely occurring if the temperature is higher than 4 °C. For snow to lie for any length of time, the temperature normally has to be lower than this. Over most of the area, snowfall is normally confined to the months from November to April, but upland areas may have falls in October and May. Snow rarely lies on low ground outside the period from November to March but over higher ground lying snow can also occur in October and as late as May. The depth of undrifted snow does not often exceed 15 cm at low altitudes but on occasions depths of 30 to 60 cm may occur over a wide area. When depths exceed 15 cm in association with strong winds, serious drifting may occur, especially in hilly areas, leading to widespread travel disruption. Notable examples affecting NE England include:

- Heavy snowfalls of 11-13 February 1978 (53 cm at Morpeth on the 13th)
- 17-18 March 1979
- 25 November-2 December 2010 (**Ref 15.3**).

Wind

15.3.13. **Figure 5** shows the long-term average monthly mean wind speed in the North East of England region between 1981 and 2010.

15.3.14. The strongest winds are associated with the passage of depressions close to or across the UK. The frequency and depth of these areas of low pressure is greatest in the winter half of the year, especially from December to February, and this is when mean speeds and gusts (short duration peak values) are strongest. The period November to March has the highest mean speeds and the peak gusts follow a similar pattern. Upland areas and coastal areas, particularly those exposed to the north, will experience stronger winds.

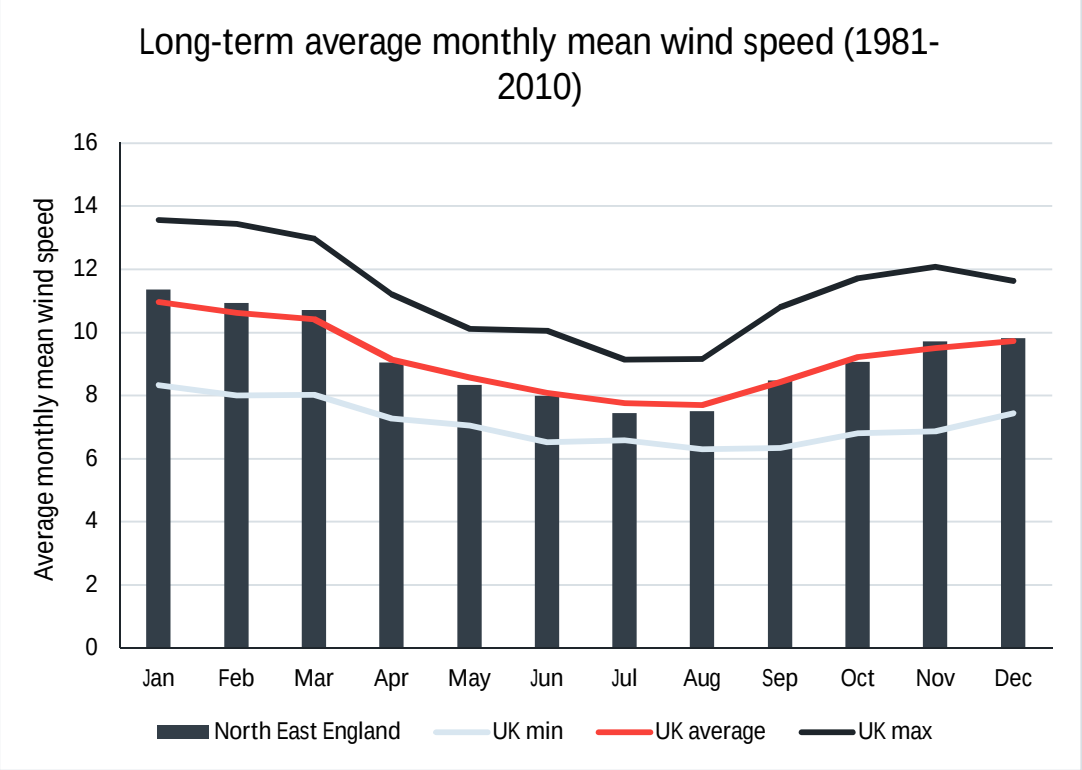

Figure 5 Long term average monthly mean wind speed

15.3.15. A day of gale is defined as a day on which the wind speed attains a mean value of 34 knots or more over any period of 10 minutes (**Ref 15.3**). Over the highest Pennines there are about 15 gales per year while along the coast gales occur on 5-10 days and low-lying places inland experience less than 5 gales per year. Wind speed is sensitive to altitude and local topographic effects. There have been several noteworthy gales affecting NE England, accompanied by property damage and disruption to travel and power supplies, including:

- 2 January 1976 - a depression moving eastwards across Scotland to the North Sea brought storm force winds with an hourly mean speed of 70 knots at South Gare (Cleveland).
- 28-29 January 2002 - rail and road transport disruption (with lorries overturning), power cuts (20,000 homes affected in the Tyne valley) and building damage (**Ref 15.3**).

Projected climate

15.3.16. Information on projected climate is taken from the UK Climate Projections 2009. The UK Climate Projections 2009 (UKCP09) are the most up-to-date projections of climate change for the UK. Probabilistic projections of a range of climate variables are presented for different emissions scenarios and for a range of time-slices to the end of the 21st Century. The projections are provided at a resolution of 25 km over land, and as averages for administrative and river basin regions.

Precipitation

15.3.17. Climate change is projected to lead to wetter winters and drier summers, with more extreme rainfall events. UKCP09 suggests that by the 2050s in the North-East England region, mean winter precipitation is expected to increase by 12% (50th percentile) and by the 2080s, increase by 19% (50th percentile) under the High emissions scenario. For the summer, by the 2050s, mean summer precipitation is expected to decrease by 15% (50th percentile) and by the 2080s, decrease by 23% (50th percentile), under the High emissions scenario. **Table 52** summarises changes in mean winter and summer precipitation in the North-East England region for the 2050s and 2080s under the Low, Medium and High emissions scenarios.

Table 52 Projected change in mean summer and winter precipitation (mm) for the 2050s and 2080s under Low, Medium and High emissions scenario

Period		Emissions scenario								
		Low			Medium			High		
		10th	50th	90th	10th	50th	90th	10th	50th	90th
Summer	2050s	-28	-12	+7	-30	-15	+1	-31	-15	+2
	2080s	-29	-13	+3	-36	-18	+1	-43	-23	0
Winter	2050s	-1	+9	+20	+1	+11	+24	+1	+12	+26
	2080s	+1	+12	+26	+2	+14	+32	+4	+19	+41

15.3.18. In addition to changes in seasonal average precipitation, it is likely that there will be more extreme rainfall events. By the 2050s, projections for the wettest day in winter for the North East England region suggest an increase of up to 20% under the High emissions scenario (central estimate). By the 2080s, projections for the wettest day in winter summer suggest increase of up to 40% under the High emissions scenario (central estimate).

15.3.19. A combination of higher summer temperatures and reduced summer rainfall could see increases in the risk of drought in the UK. UKCP09 is not suitable for the analysis of low precipitation accumulated over extended time periods (multi-year droughts), however, it does contain some information on changes at the seasonal timescale.

15.3.20. **Figure 6** shows projected changes in winter (left panels) and summer (right panels) precipitation totals expected by 2070-2099 under the UKCP09 High emissions scenario. The upper panels represent changes at the 10% probability (i.e. driest) level of the probabilistic range. The lower panels represent changes at the 90% probability (i.e. wettest) level.

15.3.21. Under the UKCK09 High emissions scenario. The top panel represents changes at the 10% probability (i.e. driest) level of the probabilistic range. The bottom panels represent changes at the 90% probability (i.e. wettest) level.

15.3.22. The overall pattern is a move toward wetter winters and drier summers suggesting that short-term summer droughts may increase in frequency. The range of the projected changes varies considerably across the probability ranges from almost no change through to shifts of greater than 70% of the 30-year average value, therefore there is large uncertainty in the magnitude of change although the direction is agreed (droughts are likely to become more frequent). Other studies, including the recent UK Climate Change Risk Assessment (CCRA) Evidence Report (**Ref 15.4**) suggest that the North-east region is expected to experience a water surplus, of between >100 to ≤ 1,000 Ml/day by the 2080s under a High emissions scenario. Therefore, risk from drought is likely to be lower than other parts of the country but may still pose a threat, particularly in the summer months.

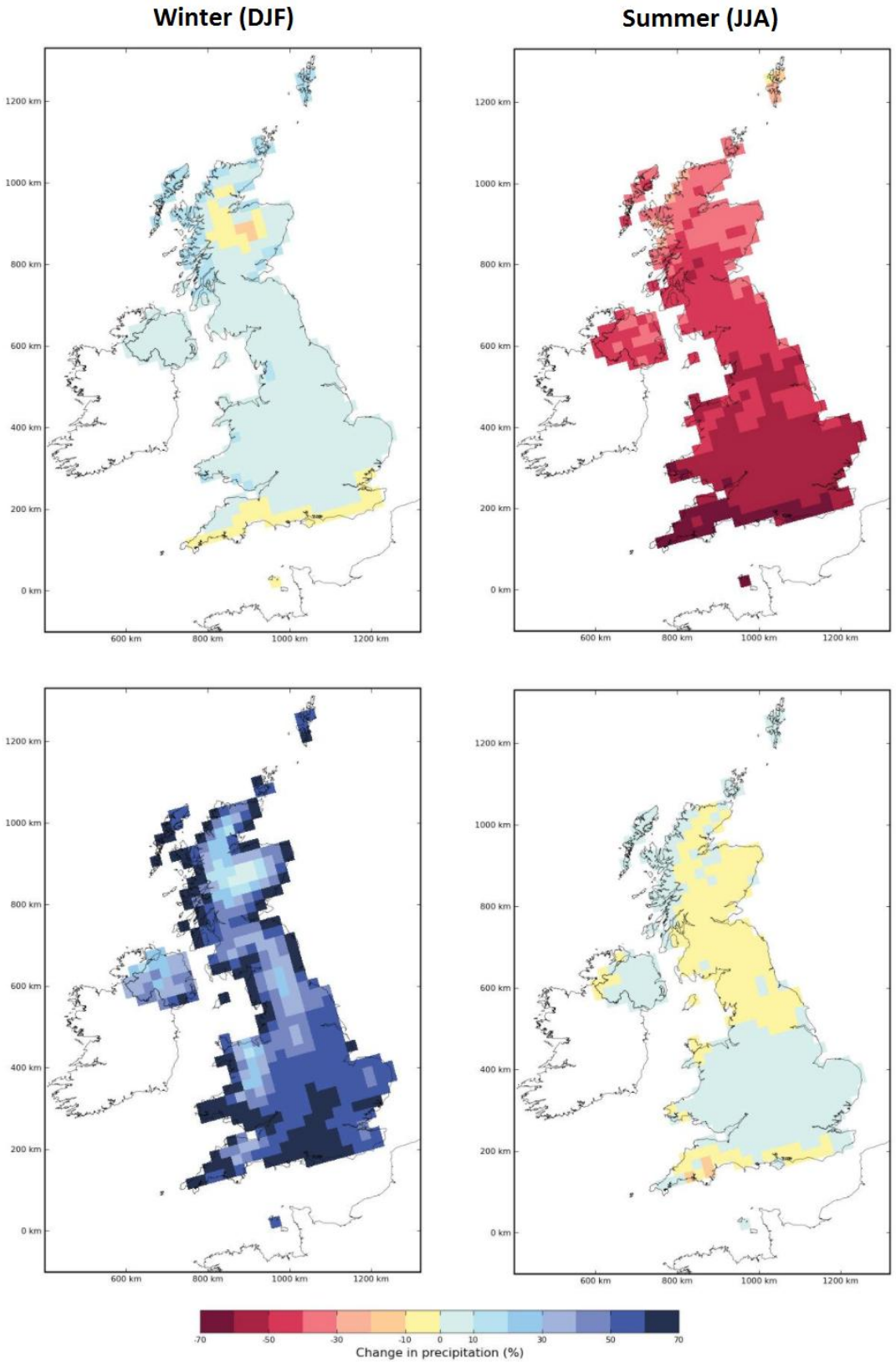

Figure 6 Projected changes in winter (left) and summer (right) total precipitation by 2080s

15.3.23. With regards to future changes in snowfall, rising winter temperatures are likely to reduce the amount of precipitation that falls as snow in winter. UKCP09 projects a reduction of mean snowfall, the number of days when snow falls and heavy snow events by the end of the 21st century. UKCP09 does not provide projections for the nearer-term for snow.

Temperature

15.3.24. Climate change is projected to lead to hotter summers and warmer winters. UKCP09 suggests that by the 2050s, mean winter temperature in the North-East England region is expected to increase by 2.2º C (50th percentile) and by the 2080s, increase by 3.1º C (50th percentile), under the High emissions scenario. For the summer, by the 2050s, mean summer temperature is expected to increase by 2.9 ºC (50th percentile) and by the 2080s, increase by 4.7º C (50th percentile), under the High emissions scenario. **Table 53** summarises changes in mean winter and summer precipitation for the 2020s, 2050s and 2080s under the Low, Medium and High emission scenarios.

Table 53 Projected change in mean summer and winter temperature (°C) for the 2050s and 2080s under Low, Medium and High emissions scenario

Period		Emissions scenario								
		Low			Medium			High		
		10th	50th	90th	10th	50th	90th	10th	50th	90th
Summer	2050s	1.1	2.4	3.8	1.2	2.5	4.1	1.4	2.9	4.7
	2080s	1.3	2.8	4.6	2.0	3.7	5.8	2.5	4.7	7.3
Winter	2050s	0.8	1.8	2.9	1.1	2.0	3.1	1.2	2.2	3.4
	2080s	1.3	2.4	3.6	1.4	2.6	4.1	1.9	3.1	4.9

15.3.25. In addition to changes in seasonal average temperatures, it is likely that there will be more extreme temperature events. By the 2050s, projections for the warmest day in summer for North East England region suggest temperature increases of up to 4º C under the High emissions scenario (central estimate). By the 2080s, projections for the warmest day in summer suggest temperature increases of up to 6º C under the High emissions scenario (central estimate).

15.3.26. With regard to heat waves, research published by the Met Office Hadley Centre suggests the European summer heat wave in 2003 could become a normal event by the 2040s. By the 2060s, such a summer would be considered cool according to some climate models (**Ref 15.5**). It is very likely (confidence level >90%) that human influence has at least doubled the risk of a heatwave exceeding mean summer temperatures experienced in 2003 (**Ref 15.6**).

Solar radiation

15.3.27. A recent (regional) study suggests that the England North region (including the UKCP09 North East England administrative region), is likely to see an increase in annual solar radiation by the 2050s of between 3.6 and 3.8 Wm-2, depending on emissions scenario (central estimate). By the 2080s, increases of between 3.9 and 4.6 Wm-2 depending on emissions scenario (central estimate) are projected (**Ref 15.7**). All regions of the UK are likely to have increased cloud cover (although there is large uncertainty around future projections of cloud cover) and therefore slightly less solar radiation during the winter. **Figure 7** shows projected change in solar radiation in the 2050s.

Wind

15.3.28. The UKCP09 projections depict a wide spread of future changes in mean surface wind speed, however, there is large uncertainty in projected changes in circulation over the UK and natural climate variability contributes much of this uncertainty (**Ref 15.8**). It is therefore difficult to represent regional wind extreme winds and gusts within regional climate models (**Ref 15.9**).

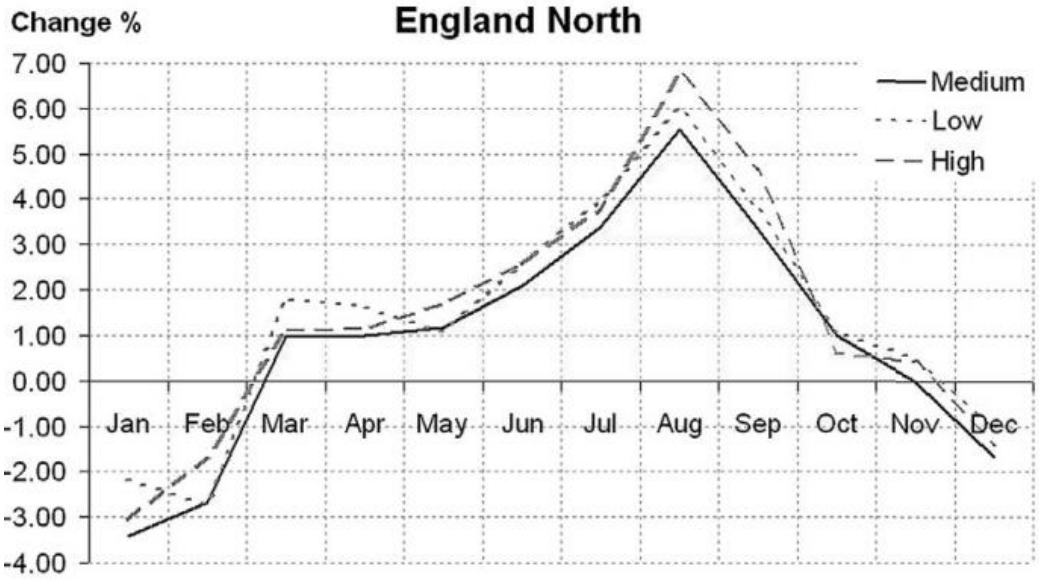

Figure 7 Projected regional average change (%) in solar radiation in the 2050s

15.3.29. Central estimates of change in mean wind speed for the 2050s are small in all ensemble runs (<0.2 ms-1). A wind speed of 0.2 ms−1 (~0.4 knots) is small compared with the typical magnitude of summer mean wind speed of about 3.6–5.1 ms-1 (7–10 knots) over much of England (**Ref.15.10**). Seasonal changes at individual locations across the UK lie within the range of –15% to +10%. Results suggest that there could be a future reduction in the summer westerly wind flows over the southern half of the UK. There may be an increase in westerly flows in the north during summer and also an increase in southerly flows over the UK in winter.

Relative humidity

15.3.30. Relative humidity is the most common measure of humidity. It measures how close the air is to being saturated. By the 2050s, projections for winter mean relative humidity in North East England suggest a decrease of up to 10% under the high emissions scenario (central estimate). By the 2080s, winter mean relative humidity could increase by up to 5% (high emissions scenario, central estimate). The projection for summer mean humidity in the 2050s under the high emissions scenario is a decrease of up to 5% (central estimate). By the 2080s the decrease could be as much as 10% (high emissions scenario, central estimate).

Extreme climate change scenarios

15.3.31. A range of 'extreme' climate change scenarios (produced by Wade et al., 2015 have also been reviewed. Wade et al., (2015) considered a range of climate variables including heatwaves, cold snaps, low and high rainfall, droughts, floods and windstorms (**Ref 15.11**). The H++ scenarios represent the margins or beyond the 10th to 90th percentile range of the 2080s UKCP09 High emissions scenario as presented in the UKCP09 projections and reported here. These scenarios provide a high-impact, low-likelihood event to compare against more likely outcomes.

15.3.32. The H++ scenarios suggest that average summer maximum temperatures will exceed 30° C across most of the UK, with temperatures of the hottest days are also likely to exceed 40° C. The H++ scenarios for heavy daily and sub-daily rainfall suggest that, for the same period, there is a 60% to 80% increase in rainfall for summer or winter events based on a consideration of new high-resolution modelling and physical processes. This is within the UKCP09 distribution range for the 2080s High emissions "wettest day of the winter" variable but higher than uplifts previously considered for summer.

15.4 POTENTIAL IMPACTS

GREENHOUSE GAS EMISSIONS

15.4.1. The impacts of GHGs relate to their contribution to global warming and climate change. These impacts are global and cumulative in nature, with every tonne of GHG contributing to impacts upon natural and human systems.

15.4.2. GHGs are natural and man-made gases occurring in the atmosphere, which absorb and emit infrared radiation thereby maintaining the Sun's energy within the Earth's atmosphere. There is an overwhelming scientific consensus that the major increase in the concentration of GHGs from man-made sources is contributing to global warming and climate change.

15.4.3. The seven main GHGs defined by the Kyoto Protocol are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and nitrogen trifluoride. In combination, these GHG emissions are commonly expressed in terms of carbon dioxide equivalents according to their relative global warming potential. For this reason, the shorthand 'carbon' may be used to refer to GHGs.

15.4.4. It is expected that emissions will occur during construction and operation. During construction, large sources of emissions are anticipated to be embedded carbon in materials including those associated with the pavement for road widening and the new junction (i.e. asphalt and aggregate) and also the bridge (i.e. structural and reinforced steel and concrete). A smaller amount of GHG emissions is associated with transport of materials from source to Site.

15.4.5. During operation, the main emissions source will be from end-users. Small amounts of GHG emissions may arise from energy use and materials consumption (e.g. asphalt repairs) associated with operation and maintenance.

RESILIENCE

15.4.6. Receptors associated with the proposed Scheme are as follows:

- Construction process
  - Construction materials;
  - Workforce; and
  - Plant.
- Assets and their operation
  - Dual carriageway road and access tracks – including pavement, supporting earthworks;
  - Grade separated junction at Charlton Mires;
  - Accommodation bridge at Broxfield;
  - Drainage infrastructure – culverts, detention basins;
  - Parking lay-bys; and
  - Signage and gantries;
- End-users
  - Travelling public; and
  - Commercial operators.

15.4.7. **Table 54** describes the potential impacts of changes in climate variables. Transport infrastructure located near the coast or in estuarine locations is sensitive to changes in sea level and storm surges. As the proposed Scheme is not in a coastal or estuarine location, variables associated with sea level are not assessed further (illustrated by grey shading in the Table).

Table 54 Climate variables and impacts

Climate variable	Potential impacts
Average air temperature (annual,	Hotter summers, warmer winters Longer growing season

Climate variable	Potential impacts
seasonal, monthly)	
Extreme air temperature (frequency and magnitude)	Heatwaves
Average precipitation (annual, seasonal, monthly)	Wetter winters, drier summers Flooding Less precipitation falling as snow and hail
Extreme rainfall (frequency and magnitude)	Flooding Increased surface water flows
Average wind speed (annual, seasonal, monthly)	Higher winds Higher wind loading on structures
Gales and extreme winds (frequency and magnitude)	Increase in frequency and intensity High winds Increase in thunderstorms
Humidity	Fog
Solar radiation	High temperatures High UV loading
Sea level	Coastal flooding

15.5 DESIGN, MITIGATION AND ENHANCEMENT MEASURES

GREENHOUSE GAS EMISSIONS

15.5.1. Design, mitigation and enhancement measures to reduce GHG emissions during construction and operation of the Scheme include:

Construction

- Maximising the use of construction materials and products with recycled or secondary and low carbon content or from renewable sources.
- Using locally-sourced materials where available and practicable to minimise the distance materials are transported from source to Site.
- Using more efficient construction plant and delivery vehicles, and / or those powered by electricity from alternative / lower carbon fuels.

Operation

- Maximise efficiency of vehicle movements by encouraging smooth and controlled traffic flows through design.
- Designing, specifying and constructing the Scheme with a view to maximising the operational lifespan and minimising the need for maintenance and refurbishment (and all associated emissions).
- Designing, specifying and constructing the Scheme with a view to maximising the potential for reuse and recycling of materials/elements at the end-of-life stage.
- Specifying high efficiency mechanical and electrical equipment as appropriate.

- Operating, maintaining and refurbishing the Scheme using best-practice efficient approaches and equipment.

RESILIENCE

15.5.2. Design, mitigation and enhancement measures to reduce vulnerability to climate change during construction and operation of the Scheme include (see also **Chapter 11 – Road Drainage and Flood Risk**: Water for further measures relevant to changing patterns of precipitation):

Construction

- Ensure site compound drainage has sufficient capacity to cope with heavy rainfall events.
- Cover spoil and material heaps during periods of high rainfall or high winds.
- Spray spoil and material heaps during dry periods to reduce dust.
- Regularly inspect materials stockpiles and structures with additional inspections during and following extreme weather events (e.g. floods, heatwaves, storms).
- Provide adequate rest, shade and PPE (e.g. hats and sun cream) for workforce during periods of high temperature and high solar radiation.
- Adjust programme of activities or schedule daily working time to account for weather conditions. Build additional contingency into the programme.

Operation

- Design drainage infrastructure and road surface to take account of projected change in rainfall.
- Slope stabilisation measures are necessary.
- Scour protection for bridge structures.
- Consider projections of extreme temperature when specifying materials e.g. use harder binders in asphalt, alter concrete mix. Re-consider choice of materials when repair or replacement is necessary.
- Regular inspection of drainage infrastructure, materials and structures to identify any deterioration. Additional inspection of earthworks and structures following extreme weather events (e.g. floods, heatwaves, drought, storm). Bring forward repair/replacement if necessary.
- More frequent vegetation management on verges.
- Back-up power source for electrical equipment and signalling.

15.6 DESCRIPTION OF THE LIKELY SIGNIFICANT EFFECTS

GREENHOUSE GAS EMISSIONS

15.6.1. The likely significant effects for climate are summarised in **Table 55**. The significance of these effects is based on currently available information, and is subject to change as the design progresses. Emissions associated with the end of life stage, i.e. decommissioning shall not be considered given the uncertainty associated with the length of operation.

Table 55 Likely significant effects for Greenhouse Gas Emissions

Phase	Effect
Construction	Increase in GHG emissions associated with materials
	Increase in GHG emissions associated with transport of materials from source to site
	Increase in GHG emissions associated with plant movements on Site
Operation	Increase in GHG emissions from end users (traffic emissions)
	Increase in GHG emissions from maintenance
	Increase in GHG emissions from use of mechanical and electrical equipment

RESILIENCE

15.6.2. The likely significant effects of climate on the proposed Scheme are summarised in **Table 56.**

Table 56 Likely significant effects of climate change

Climate variable		Effects
Precipitation	Changes in annual average	Flooding of roads (fluvial and/or pluvial) Damage to paved surfaces Scour of bridge structures Flooding of control equipment Increased maintenance requirements Decrease in snow and hail
	Drought	Drying out of soils and cracking – damage to road surfaces Drying out of earthworks – reduced stability Increase in dust
	Extreme events	Flooding of roads (fluvial and/or pluvial) Increased run-off – dangerous driving conditions Damage to paved surfaces Scour of bridge structures Flooding of control equipment Destabilisation of earthworks and embankments
Temperature	Changes in annual average	Damage to paved surfaces Increased maintenance requirements Decrease in cold weather
	Extreme temperature events	Melting and deformation of paved surfaces Increased earth pressure Increased expansion of bridge joints Uncomfortable conditions for road users
	Solar radiation	Increase vegetation growth More rapid deterioration of materials and signage
Wind	Gales and high winds	Reduced stability of above-ground infrastructure Increased rate of material degradation. Wind-driven rain infiltration into building materials and surfaces - increased maintenance requirements. Risk to high-sided vehicles Damage to signage or signals Increased wind loading on structures
	Storms	Increased risk of lightning strike on above ground infrastructure Loss of power
Soils	Soil moisture	Deformation of road surface Destabilisation of earthworks and embankments Increased risk of pluvial flooding
	Soil salinity	Mobilisation of pollutants Increase rate of materials degradation
	Soil stability	Destabilisation of earthworks and embankments

15.7 ASSESSMENT METHODOLOGY

GREENHOUSE GAS EMISSIONS

15.7.1. There are multiple GHG emissions sources associated with each lifecycle stage of the Scheme. The following emissions sources, outlined in **Table 57**, are **scoped in**.

Table 57 Emissions sources that are in scope for Greenhouse Gas Emissions

Sub-stage of lifecycle	Reasoning
Construction	
Product stage; including raw material supply, transport and manufacture	Emissions from construction materials typically form the greatest proportion of a Scheme's construction emissions. Main works include: ▪ On-line widening 8 km carriageway (single to dualled carriageway) ▪ 1 new grade-separated junctions (Charlton Mires) ▪ Multiple means of access diversions ▪ Accommodation bridge at Broxfield ▪ Six parking lay-bys
Construction process stage; including transport to / from works site and construction / installation processes.	Emissions from the construction stage can form an important part of a Scheme's emissions, and would include such emissions sources as fuel / energy consumption.
Operation	
Use of the infrastructure by the end-user	End-user emissions from the surrounding network will change (increase or decrease).
Replacement	The Scheme is anticipated to be resurfaced every 25 years

15.7.2. Emissions sources that are not included within the scope of this assessment, and the reasons why they have been **scoped out**, are presented in **Table 58.**

Table 58 Emissions sources that are out of scope for Greenhouse Gas Emissions

Sub-stage of lifecycle	Reasoning
Construction	
Land use, land use change and forestry (LULUCF)	Vegetation loss as a result of permanent land take is likely to be minimal.
Operation	
Operation and maintenance	Operation and maintenance activity (other than end user emissions, and replacement – for example Scheme lighting / maintenance visits) are expected to result in negligible GHG emissions
End of life	
Deconstruction	Decommissioning will happen several decades into the future and well beyond the period for which the UK Government has set agreed carbon budgets. It is difficult to make meaningful estimates of emissions given these timescales. The uncertainty about the future decommissioning process and associated emissions is sufficient to scope this lifecycle stage out of the emissions assessment.
Transportation of waste arisings	
Waste processing for recovery	
Disposal	

LEGISLATION, POLICY AND GUIDANCE

15.7.3. Legislation relevant to the Scheme will be presented in the ES and will consist of the following aspects:

- Directive 2014/52/EU ('The EIA Directive') (**Ref 15.2**); and
- The UK Climate Change Act (2008) (**Ref 15.3**).

15.7.4. The following policy and guidance will underpin the assessment and will be described in detail in the assessment:

- NPPF (**Ref 15.4**);
- NPS NN (**Ref 15.5**);
- NCC Local Plan (**Ref 15. 6**);
- TAG Unit A3 Environmental Impact Appraisal, Chapter 4 Greenhouse Gases (**Ref 15.7**);
- PAS 2080:2016 Carbon management in infrastructure (**Ref15.8**);
- DMRB Volume 11, Section 3, Part 1 Air Quality HA207/07 (**Ref 15.1**);
- IEMA EIA Guide to Assessing GHG emissions and evaluating their significance (**Ref 15.9**); and
- BS EN 15804:2012+A1:2013 Sustainability of Construction Works – Environmental Product Declarations (**Ref 15.10**).

15.7.5. Policy and plans relevant to the Scheme will be presented at Preliminary Design Stage which will form part of the ES and will consist of the following aspects:

- A schedule of the relevant national, regional, county and local policies; and
- A commentary setting out the significance of the impact of the Scheme on each policy objective.

Methodology

15.7.6. For all lifecycle stages and sub-stages of the Scheme, the **Detailed Level** assessment will include the following:

- Collection of available data / information on the scale of GHG emitting activities for the baseline scenario and for the Scheme. In each case, this will cover the trend for the whole study period; and
- Calculation of the GHG emissions using a standard emissions calculation methodology applying a suitable emissions factor. Road user carbon during operation will be assessed through HA 207/07 and emissions associated with maintenance / refurbishment will be assessed used the Carbon Reporting Tool.

Values will be reported as tonnes of carbon dioxide equivalents (tCO_2e).

15.7.7. The approach to emissions calculation will include comparing do-minimum with do-something scenarios, so that only the Scheme impact is assessed.

15.7.8. The lifecycle stages and corresponding emissions sources that could be included in the detailed assessment are outlined in **Table 59.**

Table 59 Lifecycle stages and key emissions sources

Lifecycle stage		Potential sources of emissions (not exhaustive)
Construction	Product stage (manufacture and transport of raw materials to suppliers)	Embodied emissions associated with extraction and manufacturing of the required raw materials. For example: ▪ Pavement for dualling, access tracks, junction improvement and lay-bys: asphalt, aggregate ▪ New accommodation bridge: steel, concrete
	Construction process stage (transport of materials and arisings to / from Site; construction process, earth movements)	Emissions from the construction stage include such emissions sources as fuel / energy consumption from: ▪ Contractors conducting construction work (i.e. fuel/electricity consumption) ▪ Delivery of materials ▪ Export and disposal of site excavations
Operation	End-user emissions (regional traffic flows)	Vehicles using highways infrastructure
	Replacement	Activities and materials for renewal of the road surface

Assessment Criteria

15.7.9. In line with the NPS NN (2014) (**Ref 15.5**), significance of impacts will be assessed by comparing estimated GHG emissions arising from the Scheme with UK carbon budgets, and the associated reduction targets, see **Table 60.** There are currently no agreed thresholds for what level of GHG emissions is considered significant in an EIA context. A judgement is however made regarding the potential significance and the need for assessment.

Table 60 UK carbon budgets

Carbon budget period	UK carbon budget
Third: 2018-2022	2,544 $MtCO_2e$
Fourth: 2023-2027	1,950 $MtCO_2e$
Fifth: 2028-2032	1,725 $MtCO_2e$

RESILIENCE

15.7.10. This section outlines the approach to assessment of climate risk in the ES. Risks associated with the high and medium vulnerabilities will be assessed in the ES.

LEGISLATION, POLICIES AND GUIDANCE

15.7.11. Legislation relevant to the Scheme will be presented in the ES and will consist of the following aspects:

- Directive 2014/52/EU ('The EIA Directive') (**Ref 15.2**); and
- The UK Climate Change Act (2008) (**Ref 15.3**).

15.7.12. The following policy and guidance will underpin the assessment and will be described in detail in the assessment:

- IEMA (2015) EIA Guide to Climate Change Resilience and Adaptation (**Ref 15.21**);
- European Commission (2013) Guidance on Integrating Climate Change and Biodiversity into EIA (**Ref 15.22**);
- European Commission (2016) Climate change and major projects (**Ref 15.23**); and
- European Commission Non-Paper Guidelines for Project Managers: Making vulnerable investments climate resilient (**Ref 15.24**).
- NPPF (**Ref 15.4**);
- NPS NN (**Ref 15.5**);
- NCC Local Plan (**Ref 15.6**);
- Highways England Climate Change Adaptation Strategy and Framework (**Ref 15.25**).

METHODOLOGY

15.7.13. Hazards related to change in climate variables are listed in **Table 54.**

15.7.14. In line with emerging guidance, the significance of these potential hazards to the proposed Scheme will be assessed through considering the likelihood (see **Table 61**) and consequence (see **Table 62**) of occurrence. These determinants are then combined to determine significance of climate hazards (see **Table 63**). The risk assessment is a qualitative assessment based on expert judgment, engagement with the project team and a review of relevant literature. This process is supplemented with quantitative data and information where available.

Table 61 Likelihood descriptions

Likelihood Category	Description (probability and frequency of occurrence)
Very high	The event occurs multiple times during the lifetime of the Scheme (60 years) e.g. approximately annually, typically 60 events.
High	The event occurs several times during the lifetime of the Scheme (60 years) e.g. approximately once every five years, typically 12 events;

Medium	The event occurs limited times during the lifetime of the Scheme (60 years) e.g. approximately once every 15 years, typically 4 events.
Low	The event occurs during the lifetime of the Scheme (60 years) e.g. once in 60 years.
Very low	The event may occur once during the lifetime of the Scheme (60 years).

Table 62 Consequence descriptions

Consequence of impact	Description
Very large adverse	National level (or greater) disruption to strategic route(s) lasting more than 1 week.
Large adverse	National level disruption to strategic route(s) lasting more than 1 day but less than 1 week OR Regional level disruption to strategic route(s) lasting more than 1 week.
Moderate adverse	Regional level disruption to strategic route(s) lasting more than 1 day but less than 1 week.
Minor adverse	Regional level disruption to strategic route(s) lasting less than 1 day.
Negligible	Disruption to an isolated section of a strategic route lasting less than 1 day.

Table 63 Significance matrix

		Measure of likelihood				
		Very low	Low	Medium	High	Very high
Measure of consequence	Negligible	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
	Minor	Not Significant	Not Significant	Not Significant	Significant	Significant
	Moderate	Not Significant	Not Significant	Significant	Significant	Significant
	Large	Not Significant	Significant	Significant	Significant	Significant
	Very large	Not Significant	Significant	Significant	Significant	Significant

15.8 ASSESSMENT ASSUMPTIONS AND LIMITATIONS

GREENHOUSE GAS EMISSIONS

15.8.1. This Scoping Report is based on currently available information.

15.8.2. There is currently no specific guidance or carbon emissions threshold to determine significance. The assessment will therefore be based on professional judgement.

RESILIENCE

15.8.3. The assessment carried out to date is based on the latest climate projections for the UK, UKCP09. These projections are due to be updated in November 2018. The assessment of climate risk to be carried out in the ES will be informed by the most up-to-date climate projections at the time of preparation.

16 ASSESSMENT OF CUMULATIVE EFFECTS

16.1 CUMULATIVE ASSESSMENT METHODOLOGY

16.1.1. This Chapter considers the cumulative effects of the Scheme. The proposed assessment methodology for cumulative effects is detailed and the scope of the cumulative effects assessment for the Preliminary Design Stage is identified.

16.1.2. For the purpose of this cumulative assessment, the following terms are defined as follows:

- "Combined effects" are defined as cumulative impacts from a single Scheme; and
- "Cumulative effects" are defined as cumulative impacts from different Schemes (in combination with the project being assessed).

16.1.3. This section describes the study area, potential impacts, potential significant effects, and the methodology prescribed for the cumulative effects assessment for the EIA.

16.1.4. Previously, cumulative effects were qualitatively discussed at the Options Selection Stage. A full assessment of the cumulative effects will be carried out at the Preliminary Design Stage as part of the ES.

16.1.5. The cumulative assessment will be based upon expert professional judgement. The assessment will follow the guidance contained in DMRB Volume 11 Section 2 Part 5 (HA 205/08) (**Ref. 16.1**), and consider the nature of the affected receptor and of the impact concerned. This assessment is also informed by the NPS NN (2014) (**Ref. 16.2**), and the Inspectorate Advice Note 17 (**Ref. 16.3**).

STUDY AREA

16.1.6. The DMRB guidance on the assessment of cumulative effects requires that the spatial boundary of the receptor / resource with potential to be affected directly, or indirectly, is considered.

16.1.7. In defining the study area consideration is given to schemes with planning permission that:

- Occur at times prior to, during or after construction of the Scheme;
- Are 'in proximity' to the Scheme; or
- Are considered likely to result in environmental effects which could act in synergy with effects arising from the Scheme.

16.1.8. The study area for combined effects has been defined for each individual topic area in line with DMRB guidance.

16.1.9. With reference to the guidance within DMRB Vol.11 Section 2 Part 5 (HA 205/08), the spatial extent for the review of cumulative effects of non-traffic related topics is defined on a case-by case basis reflecting the project, the surrounding environment and the topic that is being considered. For traffic related topics, developments with potential traffic impacts will be included where they fall within the ARN developed for the traffic model. For the purposes of this report, a 500 m study area is considered however, this will be refined by each technical topic during the detailed assessment to be presented in the ES

COMBINED EFFECTS METHODOLOGY

16.1.10. Each technical chapter will assess the categories of receptors and / or specific named receptors relevant to that topic's methodology. In some instances, the same receptor or resource may be assessed in more than one technical chapter. In these cases, there is the possibility that several individual effects on the same receptor may add up to create a significant cumulative effect. Thus, when considering the combined effects on a given receptor, several technical chapters will be reviewed.

CUMULATIVE EFFECTS METHODOLOGY

16.1.11. The DMRB (HD 205/08) guidance suggests cumulative effects should be considered for all 'reasonably foreseeable' projects and to encompass all schemes which are 'committed', including (but not necessarily limited to):

- Trunk Road projects which have been confirmed (i.e. gone through the statutory processes) in proximity to the Scheme; and
- Development projects with valid planning permissions for which statutory EIA is a requirement or a non-statutory EIA has been undertaken.

16.1.12. In addition to the above, a review of those aspects outlined in the PINS Advice Note 17 will be carried out, including:

- Other developments under construction;
- Permitted application(s), whether under PA2008 or other regimes, but not yet implemented;
- Submitted application(s) whether under PA2008 or other regimes, but not yet determined;
- Schemes on the Planning Inspectorate's Programme of Projects where a Scoping Report has been submitted;
- Other developments identified in the relevant Development Plan (and Emerging Development Plans); and
- Other developments identified in other plans and programmes (as appropriate) which set the framework for future development consents/approval, where such development is reasonably likely to come forward.

16.1.13. Consultation with NCC will be undertaken to determine whether there are any other projects in the vicinity of the Scheme that should be taken into consideration.

16.1.14. The assessment will differentiate between permanent, temporary, direct, indirect and secondary effects, beneficial or adverse.

16.1.15. When considering significance criteria, the assessment will take into account the requirements set out in the NPS NN (2014) and PINS Advice Note 17.

16.1.16. In accordance with HA 205/08, the assessment will cover the most likely significant cumulative effects, rather than reporting every potential interaction. The criteria outlined in HA 205/08 Table 2.6, will be used alongside professional judgement to determine the significance of cumulative effects.

ASSUMPTIONS AND LIMITATIONS

16.1.17. An update of planning applications in the surrounding area will be undertaken through the EIA.

16.1.18. In order to complete the cumulative effects assessment, the list of schemes to be considered as part of the traffic assessment will be finalised in Spring 2019. Any schemes, projects or other relevant developments announced after this date would therefore not be included in the traffic assessment.

16.1.19. The assessment of cumulative effects is widely recognised to be limited by the availability of baseline information and relevant environmental assessments, as well as lack of compatibility of the assessments with the other schemes. Where different schemes have employed different methodologies or criteria in their assessments, difficulties in determining the interactions between effects from different schemes can arise.

16.2 ASSESSMENT OF COMBINED EFFECTS

16.2.1. **Table 64** presents the receptors identified in the topic sections of this Scoping Report as having the potential to be cumulatively affected by the Scheme. The receptors only include those that are likely to experience potential residual significant effects from more than one topic area.

16.2.2. There is the potential for residual cumulative effects from the following:

- During construction and operation, local residential properties and recreational resources (including PRoW) could experience adverse effects associated with increase visual intrusion, light pollution, air pollution and noise pollution.
- The Scheme could have adverse effects on local commercial receptors from increased visual intrusion and noise pollution during construction and operation.
- The Scheme could potentially cause an increase in nitrogen deposition on sensitive designated ecological sites above the critical load as a result of increased traffic capacity, if there are any ecological sites located next to the ARN.
- Changes to the setting of a cultural heritage features through changes in views, light pollution, air pollution and noise levels during construction and operation.
- Changes to water quality during the construction and operation of the Scheme.

16.2.3. These potential significant residual combined effects will be reviewed and updated through the EIA.

Table 64 Potential combined effects from the Scheme

Receptor/ Resource	Notes	Air Quality	Noise and Vibration	Landscape and Visual Amenity	Cultural Heritage	Biodiversity	Road Drainage and the Water Environment	Geology and Soils	Population and Health	Material Resources	Climate
Local residential dwellings and recreational resources (including Public Rights of Way).	Changes to views, light pollution, air pollution and noise levels during construction and operation.	✓	✓	✓					✓		
Local commercial receptors	Changes to views and noise levels during construction and operation.		✓	✓					✓		
Ecological Sites adjacent to the Affected Road Network	Potential increase in nitrogen deposition on sensitive designated ecological sites above the critical load as a result of increased traffic capacity.	✓				✓					
Cultural Heritage receptors	Changes to the setting of a cultural heritage features through changes in views, light pollution, air pollution and noise levels during construction and operation.	✓	✓	✓	✓						
Surface water receptors, ponds and groundwater	Changes to water quality during the construction and operation of the Scheme					✓	✓	✓	✓		

16.3 ASSESSMENT OF CUMULATIVE EFFECTS

16.3.1. Where other improvement and construction projects are delivered at the same time as, and in proximity to the Scheme, the potential for cumulative adverse impacts and effects exists. Conversely, beneficial opportunities to maximise synergies between projects (balancing cut and fill across different schemes, for example) may also present themselves. Only topic areas in this Scoping Report that conclude there is potential for significant effects are considered.

16.3.2. **Table 65** presents proposed applications identified to inform this Scoping Report (November 2018), for consideration of cumulative effects likely to be delivered at the same time and in proximity to the Scheme. This will be reviewed and updated through the EIA.

Table 65 Applications for consideration of cumulative effects

Application Ref	Site Description	Application Description	Decision Issue Date	Approx. Distance from Scheme Footprint
16/02315/FUL	Land South of Charlton Hall, Ellingham, Northumberland	Construction of 15 timber luxury camping cabins	21/10/16	220 m south-east
18/01914/FUL	Land North East of Wandylaw Covered Reservoir, Eglingham, Northumberland	Change of use of agricultural land to mixed use tourism and agricultural land	Not known	800 m west
16/03075/SCREEN	Brownieside Quarry, Brownieside Chathill, Northumberland, NE67 5HW	Proposed re-opening and extension to quarry	15/09/2016	625 m north-west

16.3.3. In addition to the cumulative schemes listed in **Table 16.2**, the A1 in Northumberland: Morpeth to Felton scheme will also be considered in the assessment of cumulative effects. The A1 in Northumberland: Morpeth to Felton scheme forms part of Highways England's wider A1 improvement programme and involves dualling of the existing carriageway. The A1 in Northumberland: Morpeth to Felton is located approximately 12 km south of the Scheme and extends for 12.6 km between Warreners House Interchange at Morpeth to the dual carriageway at Felton. It includes approximately 6.6 km online widening and approximately 6 km of new offline highway. The construction periods for the A1 in Northumberland: Morpeth to Felton and the Scheme would overlap, with a shared site compound being utilised (see **Chapter 2 – The Scheme** for more information).

16.3.4. The ES for A1 in Northumberland: Morpeth to Felton will be available for consideration within the cumulative effects assessment for the Scheme. The potential cumulative effects from both the A1 in Northumberland: Morpeth to Felton and the Scheme will be reported within the cumulative effects chapter of the Scheme ES.

17 SUMMARY

17.1.1. A summary of the environmental topics which have been scoped into the assessment, including the level of assessment (**Simple** or **Detailed**); and those topics that have been scoped out of the assessment and a justification to support this is provided below in **Table 66.**

Table 66 Summary of environmental topics' scope

Environmental Topic and Element	Scoped In	Scoped Out	Level of Assessment	Justification for Topics Scoped Out
Air Quality				
Construction effects	X		Simple Level	
Operation – local and regional air quality	X		Simple Level	
Operation – particulate matter	X		Simple Level	
Nitrogen deposition upon ecological receptors	X		Simple Level	
Noise and Vibration				
Temporary (i.e. construction noise and vibration) effects	X		It is likely that a Detailed assessment will be required. However, this will be confirmed following initial analysis of the Scheme traffic data	
Permanent traffic noise	X		It is likely that a Detailed assessment will be required. However, this will be confirmed following initial analysis of the Scheme traffic data	
Permanent traffic vibration	X		Qualitative	
Permanent traffic nuisance	X		It is likely that a Detailed assessment will be required. However, this will be	

Environmental Topic and Element	Scoped In	Scoped Out	Level of Assessment	Justification for Topics Scoped Out
			confirmed following initial analysis of the Scheme traffic data	
Landscape and Visual				
Landscape and Visual Amenity	X		Detailed	
Cultural Heritage				
Scheduled Monuments, Listed Buildings, a Conservation Area, a Registered Park and Garden, and non-statutory designated heritage assets, including below-ground and earthwork archaeological remains, and historic landscapes. The designated heritage assets situated within the Alnwick Grade I Registered Park and Garden but located outside of the 1 km study area are also scoped in for further assessment as they contribute the importance of the Park and Garden.	X		Detailed	
World Heritage Sites and Historic Battlefields		X		No World Heritage Sites or Historic Battlefields are located within the 1 km study area and therefore these groups of assets are scoped out of the EIA.
Biodiversity				
Designated statutory and non-statutory ecological sites of importance.		X		All designated statutory and non-statutory sites of importance are **scoped out** of the EIA as the Scheme is not likely to generate significant impacts upon them due to the distances between the Scheme and the sites of interest.

Environmental Topic and Element	Scoped In	Scoped Out	Level of Assessment	Justification for Topics Scoped Out
All priority habitats in the study area, including: ■ Arable field margins; ■ Hedgerows; ■ Lowland heath – encompassing dry heath/acid grassland mosaic recorded on Site; ■ Lowland mixed deciduous woodland – encompassing broadleaved/mixed/coniferous plantation and broadleaved semi-natural woodland recorded on Site; ■ Running Water - Rivers and streams; and ■ Standing water. Ecological surveys are still ongoing meaning additional priority habitats could be identified within the study area and, therefore, included in the ES	X		Detailed*	
Protected and notable species in the study area including: ■ Badger; ■ Bats; ■ Great Crested Newt; ■ Water Vole; ■ Birds, including Barn Owl; ■ Reptiles; ■ Red squirrel; and ■ Terrestrial invertebrates.	X		Detailed*	

Environmental Topic and Element	Scoped In	Scoped Out	Level of Assessment	Justification for Topics Scoped Out
▪ Ecological surveys are still ongoing meaning additional protected and notable species could be identified within the study area and, therefore, included in the ES.				
Road Drainage and the Water Environment				
Surface water features and groundwater features that are located outside of the 0.5 km study area and are considered to not be hydraulically connected to the Scheme.		X		This is because these features are considered to not be hydraulically connected to the Scheme and therefore there are unlikely to be any significant effects.
Water quality of surface water and groundwater features during construction.	X		Simple	
Water quality of surface water and groundwater features during operation.	X		Simple Level assessment will be undertaken initially. A Detailed Level assessment will be undertaken if required.	
Hydromorphological quality of surface water features during construction and operation	X		Qualitative	
Flood risk of the surrounding area and the Scheme itself associated with temporary works during construction.	X		Qualitative	

Environmental Topic and Element	Scoped In	Scoped Out	Level of Assessment	Justification for Topics Scoped Out
Flood risk of the surrounding area and the Scheme itself associated with permanent works during operation.	X		It is assumed that the assessment will be Detailed. However, this approach will be confirmed will be the Environment Agency.	
Water Framework Directive assessment	X		Simple	
Geology and Soils				
Impacts relating to: ▪ Agricultural land; ▪ Soil quality; ▪ Potential mineral resources; ▪ Historical mining activities; ▪ Earthworks; ▪ Construction phase activities; ▪ Potential for encountering potentially contaminated made ground; and ▪ Operational phase of the Scheme	X		Detailed*	
Statutory/non-statutory sites of geological importance		X		No sites have been identified within the study area or surrounding area.
Population and Health				
Residential and physical assets as well as open space and	X		Simple*	

Environmental Topic and Element	Scoped In	Scoped Out	Level of Assessment	Justification for Topics Scoped Out
recreational land use during construction.				
Community amenity and severance during construction.	X		Simple	
Impacts on NMUs including pedestrians, cyclists and equestrians during construction and operation.	X		Simple	
Local economy and employment during construction.	X		Simple*	
Human health in relation to air quality, noise and vibration, and road drainage and the water environment during construction and operation	X		Simple*	
Impacts on vehicle travellers during construction and operation.	X		Simple	
Open/green space or recreational facilities within or adjacent to the Scheme.		X		There is no open/green space or recreational facilities within or adjacent to the Scheme and therefore no assessment of land-take on such land uses will be undertaken.
Physical assets and land use during operation.		X		Impacts on physical assets and land use are not expected to be significant during the operation of the Scheme.
Community amenity and severance during operation.		X		Impacts on community amenity and severance are not expected to be significant during the operation of the Scheme.
Local economy and employment during operation.		X		Impacts on the local economy and employment are not expected to be significant during the operation of the Scheme.

Environmental Topic and Element	Scoped In	Scoped Out	Level of Assessment	Justification for Topics Scoped Out
Driver views from the road for vehicle travellers on the A1 during construction and operation.		X		Views from the road are not expected to be significantly adversely affected during construction due to the temporary nature and phasing of the construction works. During operation, it is anticipated that views from the Scheme would be similar to current views from the A1. This is due to the nature of the Scheme which primarily includes online widening to east of the existing A1. assessment.
Development land during construction and operation		X		It is not anticipated that there would be any significant effects on development land in relation to Main Scheme and both site compounds.
Materials				
The consumption of material resources including the generation and use of arisings recovered from Site during construction	X		Detailed	
The production and disposal of waste to landfill	X		Detailed	
Lifecycle assessment of materials and waste		X		The effort and resources required to undertake a full lifecycle assessment of these elements are deemed disproportionate to the benefit they would offer the assessment of significance of effect.
Materials consumption as well as site arisings and waste production beyond the first year of operation		X		The impacts associated with the Scheme have been deemed to be not significant.
Climate				
GHG emission from product stage during construction, including raw material supply, transport and manufacture.	X		Detailed**	

Environmental Topic and Element	Scoped In	Scoped Out	Level of Assessment	Justification for Topics Scoped Out
GHG emissions from construction process stage, including transport to / from works site and construction / installation processes.	X		Detailed**	
GHG emissions from use of infrastructure by the end-users	X		Detailed**	
GHG emissions from replacement, specifically resurfacing, during operation.	X		Detailed**	
Climate resilience (including sea level, precipitation, extreme rainfall, air temperature, wind speed, gales and extreme winds, humidity and solar radiation)	X		Simple**	
Land use, land use change and forestry (LULUCF) during construction		X		Vegetation loss as a result of permanent land take is likely to be minimal.
Operation and maintenance of the Scheme, excluding end user emissions and replacement		X		Operation and maintenance activity (other than end user emissions, and replacement – for example Scheme lighting / maintenance visits) are expected to result in negligible GHG emissions
Emission sources at as end of life (decommissioning) stage e.g. deconstruction and management of materials, transportation of waste arisings, waste processing for recovery and disposal.		X		Decommissioning will happen several decades into the future and well beyond the period for which the UK Government has set agreed carbon budgets. The uncertainty about the future decommissioning process and associated emissions is sufficient to scope this lifecycle stage out of the emissions assessment.

Environmental Topic and Element	Scoped In	Scoped Out	Level of Assessment	Justification for Topics Scoped Out
Cumulative Effects				
Combined effects	X		Detailed	
Cumulative effects	X		Detailed	
Major Accidents and Hazards				
Major Accidents and Hazards assessment***	X		Simple**	
Heat and Radiation				
Heat and Radiation effects		X		Due to the scale and nature of the Scheme, it is not anticipated that there will be any significant sources of heat or radiation either during construction or operation of the road.
Transboundary				
Transboundary effects		X		It is considered that the Scheme would not generate significant effects upon any other EEA States, as reported in the Screening Matrix (Planning Inspectorate Advice Note 12, December 2015) in **Appendix B**.

*It should be noted that the DMRB does not make a distinction for the level of assessment for these topics. This level of assessment is therefore based on professional judgement which has been informed by the nature and scale of the Scheme.
**The DMRB does not currently contain any guidance for the assessment of climate as well as major accidents and hazards. The level of assessment is therefore based on professional emerging guidance and industry best practice.
***The findings of the Major Accidents and Hazards assessment will form a technical appendix to the ES that will be cross-referenced within the relevant technical chapters

18 NEXT STEPS

18.1 SCOPING CONSULTATION

18.1.1. This Environmental Scoping Report will be submitted to the Planning Inspectorate, which will then consult the statutory bodies under The EIA Regulations to receive input that will be used to inform its Scoping Opinion. The Scoping Opinion will then be used to inform the scope of works to be considered within the ES.

18.2 PRELIMINARY ENVIRONMENTAL INFORMATION REPORT

18.2.1. A PEIR will be published ahead of the statutory consultation period due to begin in early 2019. The PEIR will be informed by this Scoping Report and the Planning Inspectorate's Scoping Opinion. The purpose of the PEIR is to enable stakeholders including statutory consultees and the local community to understand the potential environmental effects associated with the Scheme so as to inform their consultation response. The report will contain a Scheme overview and a summary of the potential environmental effects associated with the Scheme.

18.3 ENVIRONMENTAL IMPACT ASSESSMENT

18.3.1. An EIA will be undertaken in line with the Scoping Report and Scoping Opinion to assess the effects of the Scheme on the environment. The EIA will be presented in an ES.

REFERENCES

Ref 1.1 WSP (2018) A1 in Northumberland - Alnwick to Ellingham: Environmental Impact Assessment Screening (Determination)

Ref 1.2 Ministry of Housing, Communities & Local Government (2018) National Planning Policy Framework

Ref 1.3 Department for Transport (2014) National Policy Statement for National Networks

Ref 2.1 Jacobs (2014) A1N Feasibility Study, B1980200 Rev 1.

Ref 2.2 Jacobs (2017) A1 in Northumberland: Option Selection Environmental Assessment Report. Volume 1 – main text, Version 1.0 (March 2017)

Ref 3.1 Jacobs (2017) A1 in Northumberland: Option Selection Environmental Assessment Report. Volume 1 – main text, Version 1.0 (March 2017)

Ref. 5.1 Highways England (2008) Design Manual for Roads and Bridges (DMRB) Volume 11 Section 2 Part 5 (HA 205/08) Assessment and Management of Environmental Effects.

Ref. 5.2 Highways England (2015) Interim Advice Note 125/15 Environmental Assessment Update.

Ref. 5.3 Department for Transport (2014) National Policy Statement for National Networks. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387222/npsnn-print.pdf (Accessed August 2018).

Ref. 5.4 Health and Safety (2015) A Guide to the Control of Major Accidents Hazards Regulations (COMAH) 2015. Available at: http://www.hse.gov.uk/pubns/books/l111.htm (Accessed August 2018)

Ref. 5.5 Defra (2011), Guidelines for Environmental Risk Assessment and Management: Green Leaves III, Cranfield University and Department for Environment, Food and Rural Affairs.

Ref 5.6 Cabinet Office (2017) National Risk Register of Civil Emergencies.

Ref. 5.7 The Planning Inspectorate (2015) Advice Note 12. Transboundary Impacts

Ref 6.1 HA207/07 DMRB Volume 11 Section 3 Part 1, May 2007 http://www.standardsforhighways.co.uk/dmrb/

Ref 6.2 Department for Transport National Policy Statement for National Networks, December 2014, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/387223/npsnn-web.pdf

Ref 6.3 Defra background maps - http://uk-air.defra.gov.uk/data/gis-mapping accessed 05/06/2018

Ref 6.4 IAN 175/13, June 2013, http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian175.pdf

Ref 6.5 DEFRA Local Air Quality Management Technical Guidance (TG16), April 2016 https://laqm.defra.gov.uk/technical-guidance/index.html

Ref 6.6 IAN 170/12v3, November 2013 http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian170v3.pdf

Ref 6.7 IAN 174/13, June 2013 http://www.standardsforhighways.co.uk/ha/standards/ians/pdfs/ian174.pdf

Ref 6.8 IAN 185/15, January 2015 http://www.standardsforhighways.co.uk/ha/

Ref 7.1 Highways Agency. (2011). Design Manual for Roads and Bridges, Volume 11, Section 3 - Part 7 HD213/11, Noise and Vibration (November 2011). London: Highways Agency.

Ref 7.2 Highways Agency (2015) Interim Advice Note 185/15 Updated traffic, air quality and noise advice on the assessment on link speeds and generation of vehicle data into 'speed-bands' for users of DMRB Volume 11, Section 3, Part 1 'Air Quality and Volume 11, Section 3. Part 7 Noise.

Ref 7.3 Department for Environment, Food and Rural Affairs, January 2014. Noise Action Plan: Roads (Including Major Roads) Environmental Noise (England) Regulations 2006, as amended.

Ref 7.4 https://data.gov.uk/data/map-preview?url=http%3A%2F%2Fenvironment.data.gov.uk%2Fds%2Fwms%3FSERVICE%3DWMS%26INTERFACE%3DENVIRONMENT--a0c730ad-1366-4d22-bb04-244e18f216b4%26request%3DGetCapabilities&n=55.8&w=-5.7&e=1.8&s=50.0

Ref 7.5 Communities and Local Government (March 2012) National Planning Policy Framework and Planning Practice Guidance https://www.gov.uk/government/publications/national-planning-policy-framework--2

Ref 7.6 DEFRA (2010) Noise Policy Statement for England https://www.gov.uk/government/publications/noise-policy-statement-for-england

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ABBREVIATIONS

Acronym	Description
A1 M2F	A1 Northumberland Morpeth to Felton improvement scheme
A1 M2F	A1 Northumberland Morpeth to Felton improvement scheme
AADT	Annual Average Daily Traffic;
AAWT	Annual Average Weekly Traffic
AHLV	Area of High Landscape Value
ALC	Agricultural Land Classification
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
APIS	Air Pollution Information System
AQMA	Air Quality Management Area;
ARN	Affected Road Network;
BGS	British Geological Survey
BoCC	Birds of Conservation Concern
BoQ	Bill of Quantities
BRE	Building Research Establishment
BS	British Standards
CDE	Construction, Demolition and Excavation
CDF	Collaborative Delivery Framework
CDM	Construction Design & Management
CEMP	Construction Environment Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologists
CL:AIRE	Contaminated Land: Applications in Real Environments
CROW	Countryside Right of Way Act
CSM	Conceptual Site Model
dB	Decibels
D-BoQ	Demolition Bill of Quantities
DCLG	Department for Communities and Local Government
DCO	Development Consent Order

Acronym	Description
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
EAR	Environmental Assessment Report
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ES	Environmental Statement
FRA	Flood Risk Assessment
GHG	Greenhouse Gas
GLVIA3	Guidelines for Landscape and Visual Impact Assessment 3rd Edition
HADDMS	Highways Agency (now England) Drainage Data Management System
HAWRAT	Highways Agency (now England) Water Risk Assessment Tool
HDV	HDV – Heavy Duty vehicle;
HE	Historic England
HER	Historic Environment Reference
HLC	Historic Landscape Characterisation
HSI	Habitat Suitability Index
IAN	Interim Advice Note
IEA	Institute of Environmental Assessment
LAQM	Local Air Quality Management;
LBAP	Local Biodiversity Action Plan
LCA	Landscape Character Area
LCT	Landscape Character Type
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
LVIA	Landscape and Visual Impact Assessment
MAFF	Ministry for Agriculture, Fisheries and Food
MAGIC	Multi-Agency Geographic Information for the Countryside
MMP	Materials Management Plan

Acronym	Description
$MtCO_2e$	Megatonnes of carbon dioxide equivalent
NCA	National Character Area
NCC	Northumberland County Council
NHER	Northumberland Historic Environment Record
NHLE	National Heritage List England
NIA	Noise Important Area
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework
NPSE	Noise Policy Statement for England
NPSNN	National Policy Statement for National Networks;
NRMM	Non-road mobile machinery
NSIP	Nationally Significant Infrastructure Projects
NVQ	National Vocational Qualification
ONS	Office for National Statistics
OS	Ordnance Survey
PCM	Pollution Climate Mapping model;
PDSA	Pre-Desk Study Assessment
PEIR	Preliminary Environmental Information Report
PHE	Public Health England
PINS	Planning Inspectorate
PPE	Personal Protective Equipment
PPG	Planning Practice Guidance
PPV	Peak Particle Velocity
PRoW	Public Right of Way
PSSR	Preliminary Sources Study Report
RAF	Royal Air Force
RAMS	Risk Assessments and Method Statements
RBMP	River Basin Management Plan
RIGS	Regionally Important Geological or Geomorphological Sites
RPE	Respiratory Protective Equipment

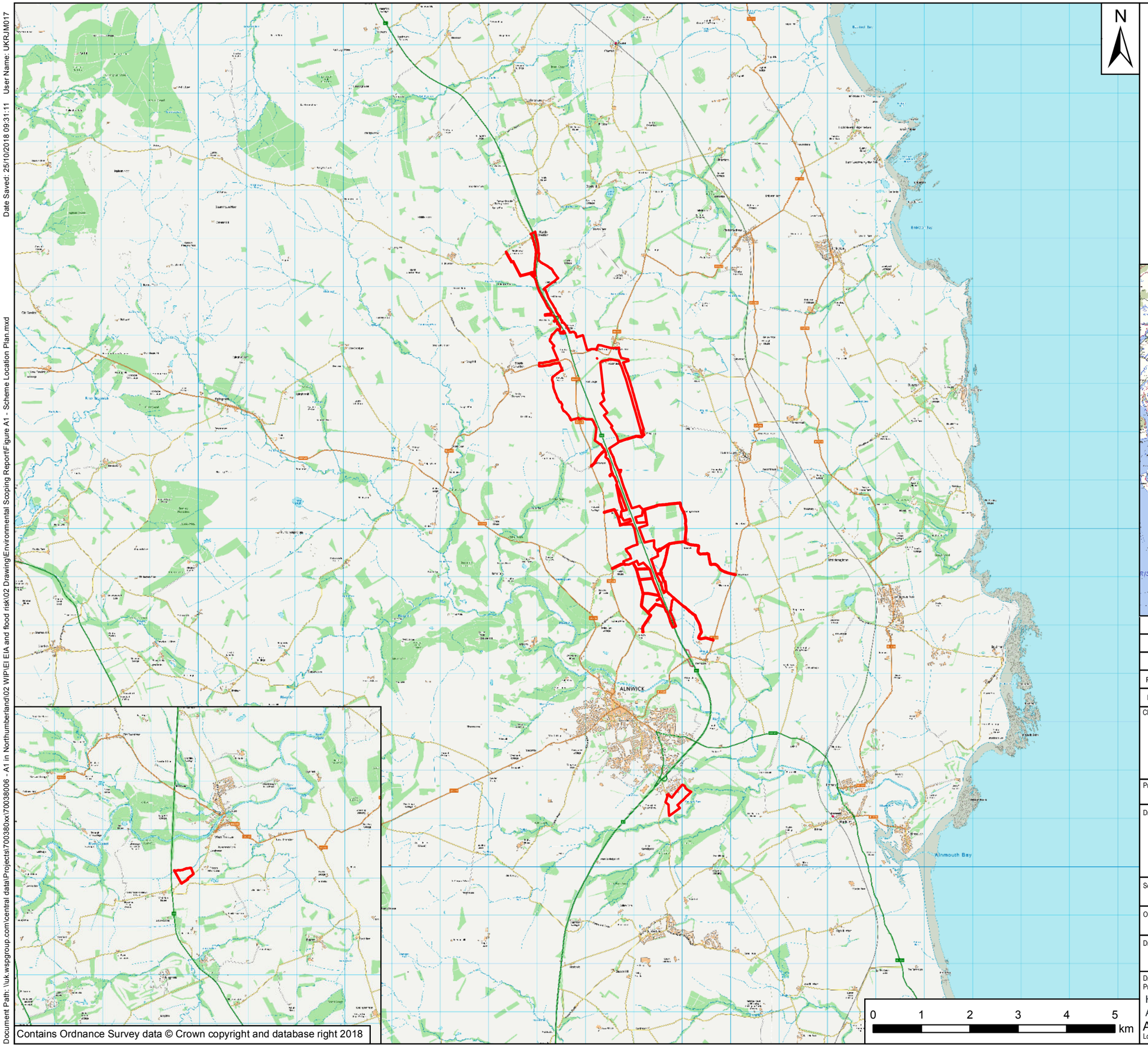
Acronym	Description
SAC	Special Area for Conservation
SFRA	Strategic Flood Risk Assessment
SOAEL	Significant Observed Adverse Effect Level
SPA	Special Protection Area
SPD	Supplementary Planning Document
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SUDS	Sustainable Drainage Systems
TCO_2e	Tonnes of carbon dioxide equivalent
TRA	Traffic Reliability Area
UKBAP	United Kingdom Biodiversity Action Plan
UXO	Unexploded Ordnance
WCA	Wildlife and Countryside Act
WFD	Water Framework Directive
ZTV	Zone of Theoretical Visibility

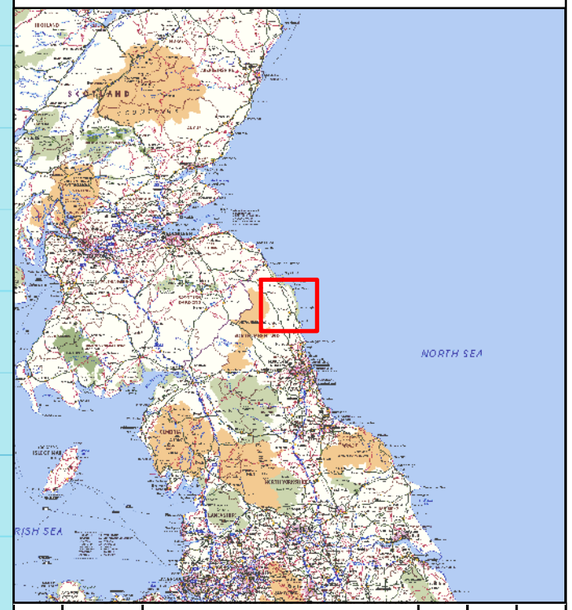
Appendix A

FIGURES

Date Saved: 25/10/2018 09:31:11 User Name: UKRJM017

Document Path: \\uk.wspgroup.com\central data\Projects\700380xx\70038006 - A1 in Northumberland\02 WIP\EI EIA and flood risk\02 Drawing\Environmental Scoping Report\Figure A1 - Scheme Location Plan.mxd





Rev	Date	Description	By	Chk'd	App'd
P01	18/10/18	First Issue	GH	LM	KS

Client

highways england

Project Title
A1 in Northumberland: Alnwick to Ellingham Scheme

Drawing Title
Figure A1 - Scheme Location Plan

Scale	Drawn	Checked	Approved	Authorised
1:75,000	GH	LM	KS	DM
Original Size	Date	Date	Date	Date
A3	18/10/18	18/10/18	18/10/18	18/10/18

Drawing Status: PO2

Suitability: S1

Drawing Number
Project | Originator | Volume
HE551459-WSP-EGN- WSP
A2E-RP-LE-1257
A2E
Location | Type | Role | Number

Project Ref. No.: 70038006

Revision: P02

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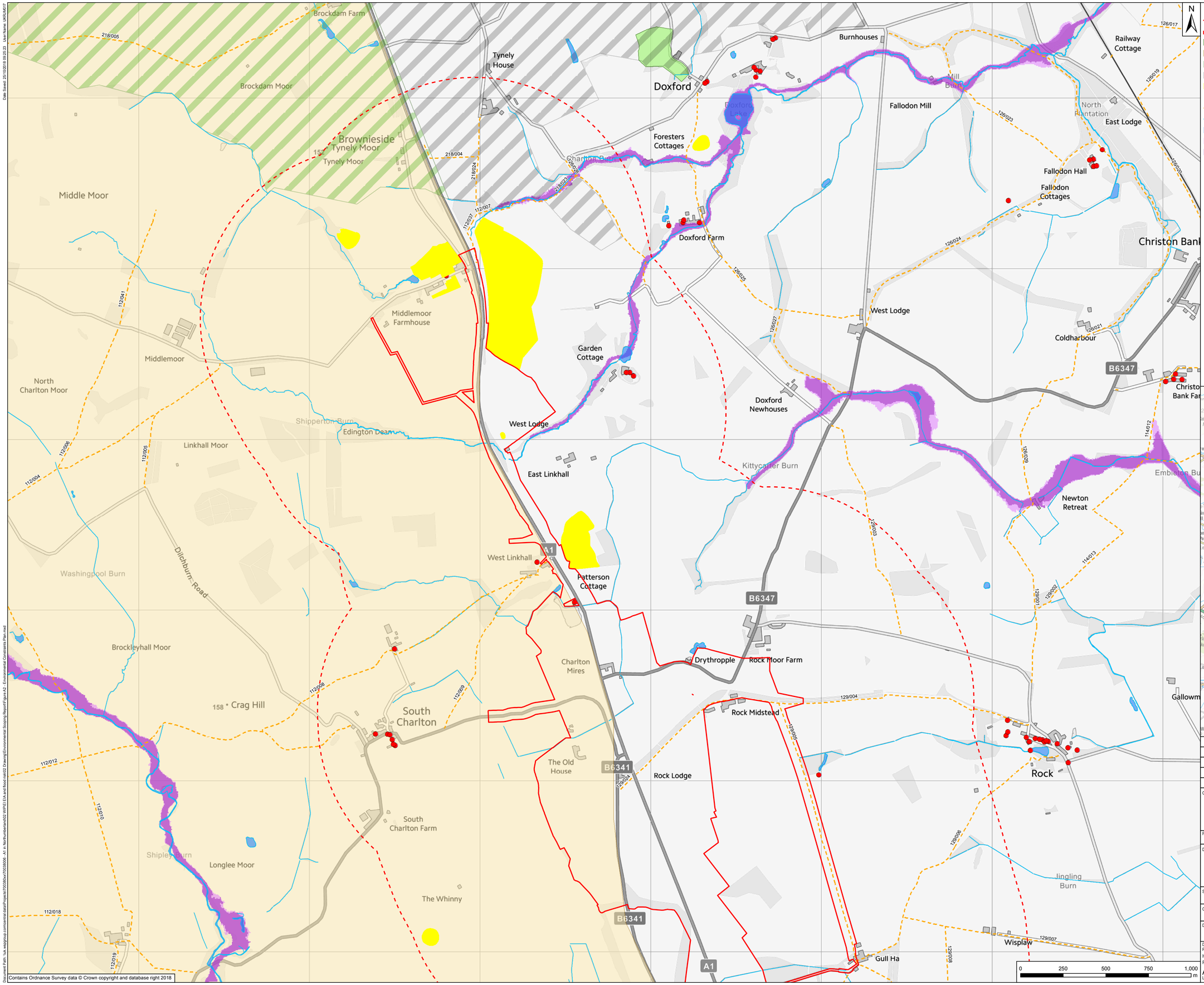

Rev	Date	Description	By	Chk'd	App'd
P01	18/10/18	First Issue	GH	LM	KS

Client: highways england

Project Title: A1 in Northumberland: Alnwick to Ellingham Scheme

Drawing Title: Figure A2 Environmental Constraints Plan
Page 1 of 4

Scale	Drawn	Checked	Approved	Authorised
1:10,000	GH	LM	KS	DM
Original Size	**Date**	**Date**	**Date**	**Date**
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Drawing Status: PO2

Suitability: S1

Drawing Number: HE551459-WSP-EGN-A2E-RP-LE-1257

Project | Originator: WSP | Volume | Location: A2E | Type | Role | Number

Project Ref. No.: 70038006

Revision: P02

Document Path: \\uk.wspgroup.com\central data\Projects\70038006\70038006 - A1 in Northumberland\02 WIP\EI EIA and flood rev02 Drawing\Environmental Scoping Report\Figure A2 - Environmental Constraints Plan.mxd

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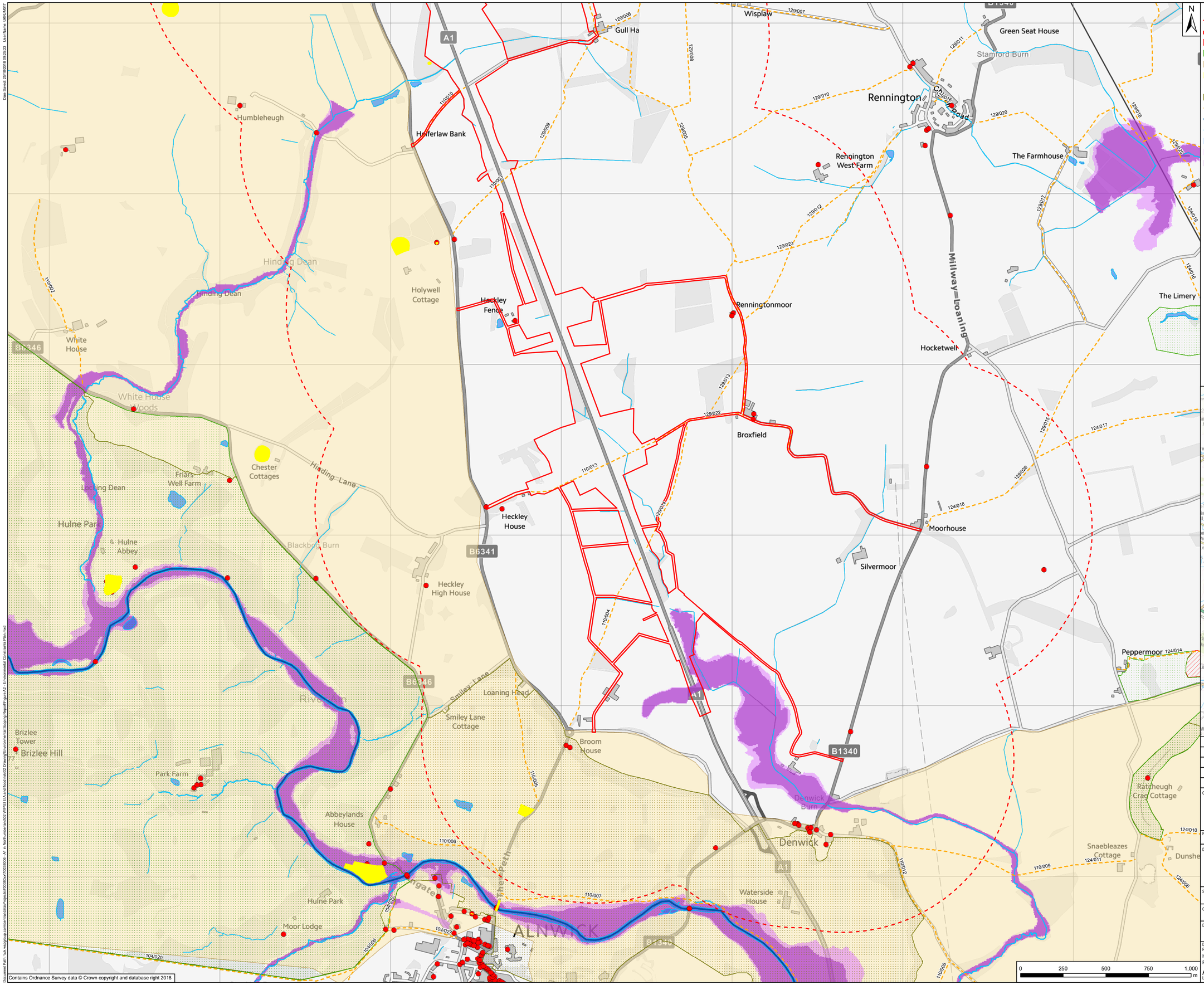
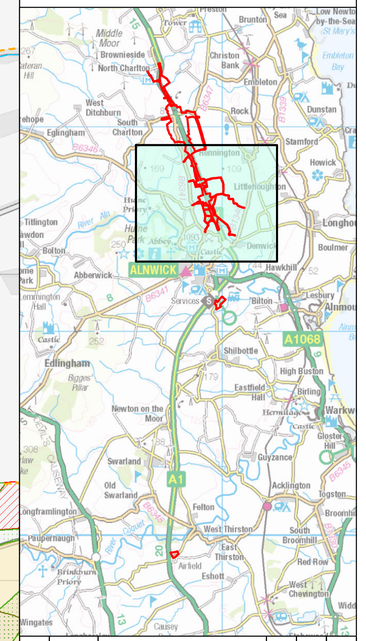


N

Key

- Scheme Boundary
- 1km Study Area
- Site of Special Scientific Interest
- Local Wildlife Sites
- Area of High Landscape Value
- Scheduled Monuments
- Listed Building - Point (to be clipped)
- Parks and Gardens
- Public Rights of Way
- Statutory Main Rivers
- Surface Watercourses
- Surface Water Bodies
- Flood Zone 2
- Flood Zone 3



Rev	Date	Description	By	Chk'd	App'd
P01	18/10/18	First Issue	GH	LM	KS

Client: highways england

Project Title: A1 in Northumberland: Alnwick to Ellingham Scheme

Drawing Title: Figure A2 Environmental Constraints Plan
Page 2 of 4

Scale	Drawn	Checked	Approved	Authorised
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Original Size	**Date**	**Date**	**Date**	**Date**
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Drawing Status: PO2

Suitability: S1

Drawing Number / Project / Originator / Volume: HE551459-WSP-EGN-A2E-RP-LE-1257 — WSP

Project Ref. No.: 70038006

Revision: P02

Location: A2E | Type | Role | Number

Date Saved: 25/10/2018 09:25:20 User Name: UKR14017

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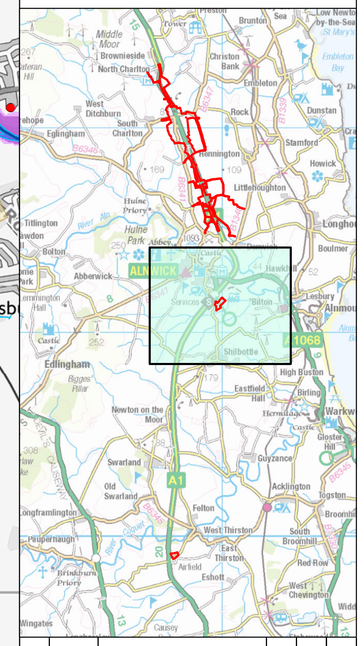
Key

- Scheme Boundary
- 1km Study Area
- Ancient Woodland Inventory
- Local Wildlife Sites
- Area of High Landscape Value
- Scheduled Monuments
- Listed Building - Point (to be clipped)
- Parks and Gardens
- Public Rights of Way
- Statutory Main Rivers
- Surface Watercourses
- Surface Water Bodies
- Flood Zone 2
- Flood Zone 3



Rev	Date	Description	By	Chk'd	App'd
P01	18/10/18	First Issue	GH	LM	KS

Client: highways england

Project Title: A1 in Northumberland: Alnwick to Ellingham Scheme

Drawing Title: Figure A2 Environmental Constraints Plan
Compound at Lionheart Industrial Estate
Page 3 of 4

Scale	Drawn	Checked	Approved	Authorised
1:10,000	GH	LM	KS	DM
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Drawing Status: PO2

Suitability: S1

Drawing Number: HE551459-WSP-EGN-A2E-RP-LE-1257
Project | Originator | Volume
Location | Type | Role | Number: A2E

Project Ref. No.: 70038006

Revision: P02

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N

Key

- Scheme Boundary
- 1km Study Area
- Site of Special Scientific Interest
- Ancient Woodland Inventory
- Local Wildlife Sites
- Area of High Landscape Value
- Landfill
- Scheduled Monuments
- Listed Building - Point (to be clipped)
- Conservation Area
- Public Rights of Way
- Statutory Main Rivers
- Surface Watercourses
- Surface Water Bodies
- Flood Zone 2
- Flood Zone 3

0 250 500 750 1,000 m

Rev	Date	Description	By	Chk'd	App'd
P01	18/10/18	First Issue	GH	LM	KS

Client: highways england

Project Title: A1 in Northumberland: Alnwick to Ellingham Scheme

Drawing Title: Figure A2 Environmental Constraints Plan
Compound at West Moor Junction
Page 4 of 4

Scale	Drawn	Checked	Approved	Authorised
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Drawing Status: PO2

Suitability: S1

Drawing Number / Project: HE551459-WSP-EGN-A2E-RP-LE-1257

Originator: WSP

Volume:

Project Ref. No.: 70038006

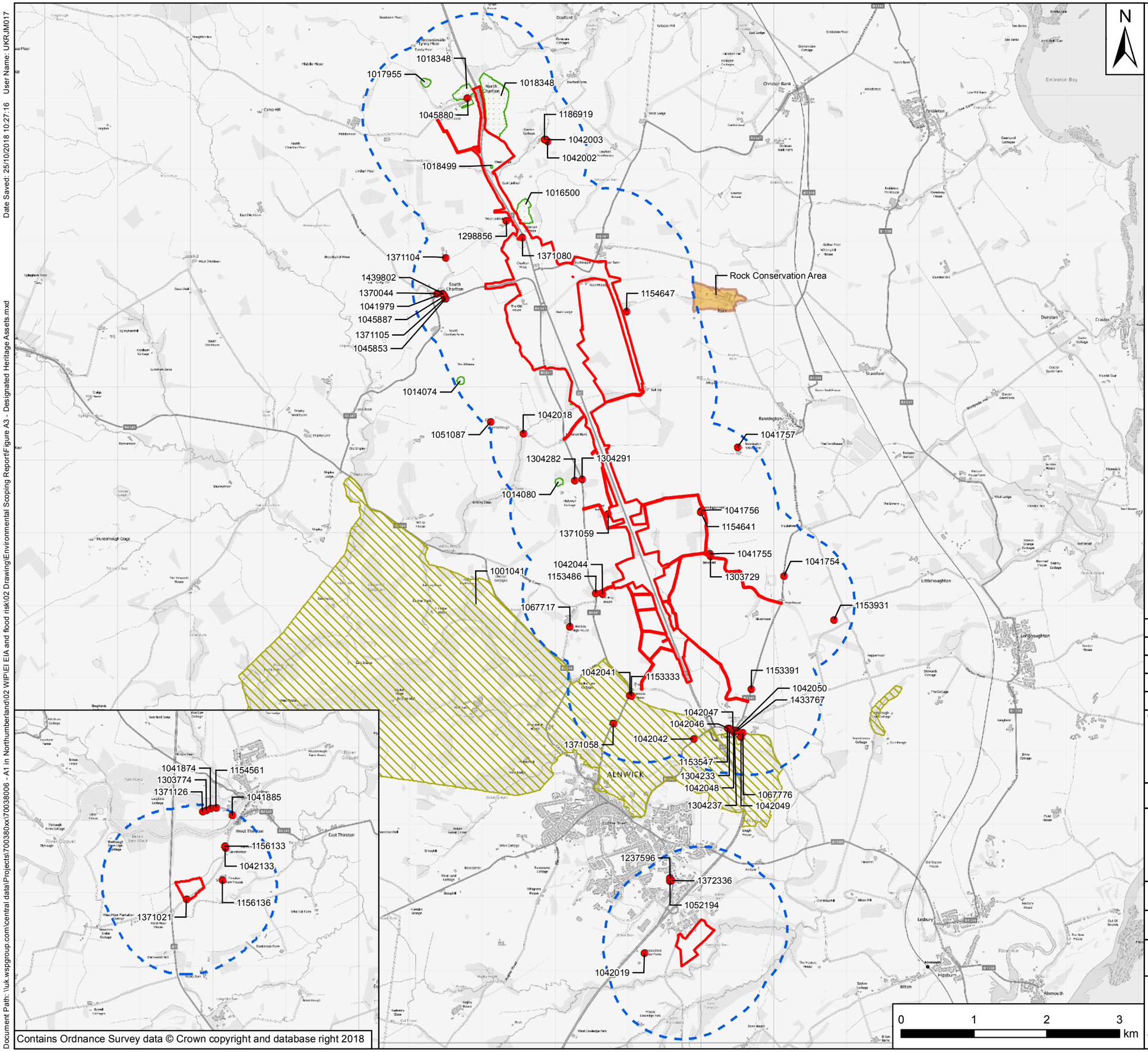
Location: A2E

Type:

Role:

Number:

Revision: P02



Rev	Date	Description	By	Chk'd	App'd
P01	18/10/18	First Issue	GH	SH	KS

Client: highways england

Project Title: A1 in Northumberland: Alnwick to Ellingham Scheme

Drawing Title: Figure A3 - Designated Heritage Assets

Scale	Drawn	Checked	Approved	Authorised
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Drawing Status: PO2

Suitability: S1

Drawing Number: Project HE551459-WSP-EGN-A2E-RP-LE-1257 | Originator WSP | Volume A2E | Location | Type | Role | Number

Project Ref. No.: 70038006

Revision: P02

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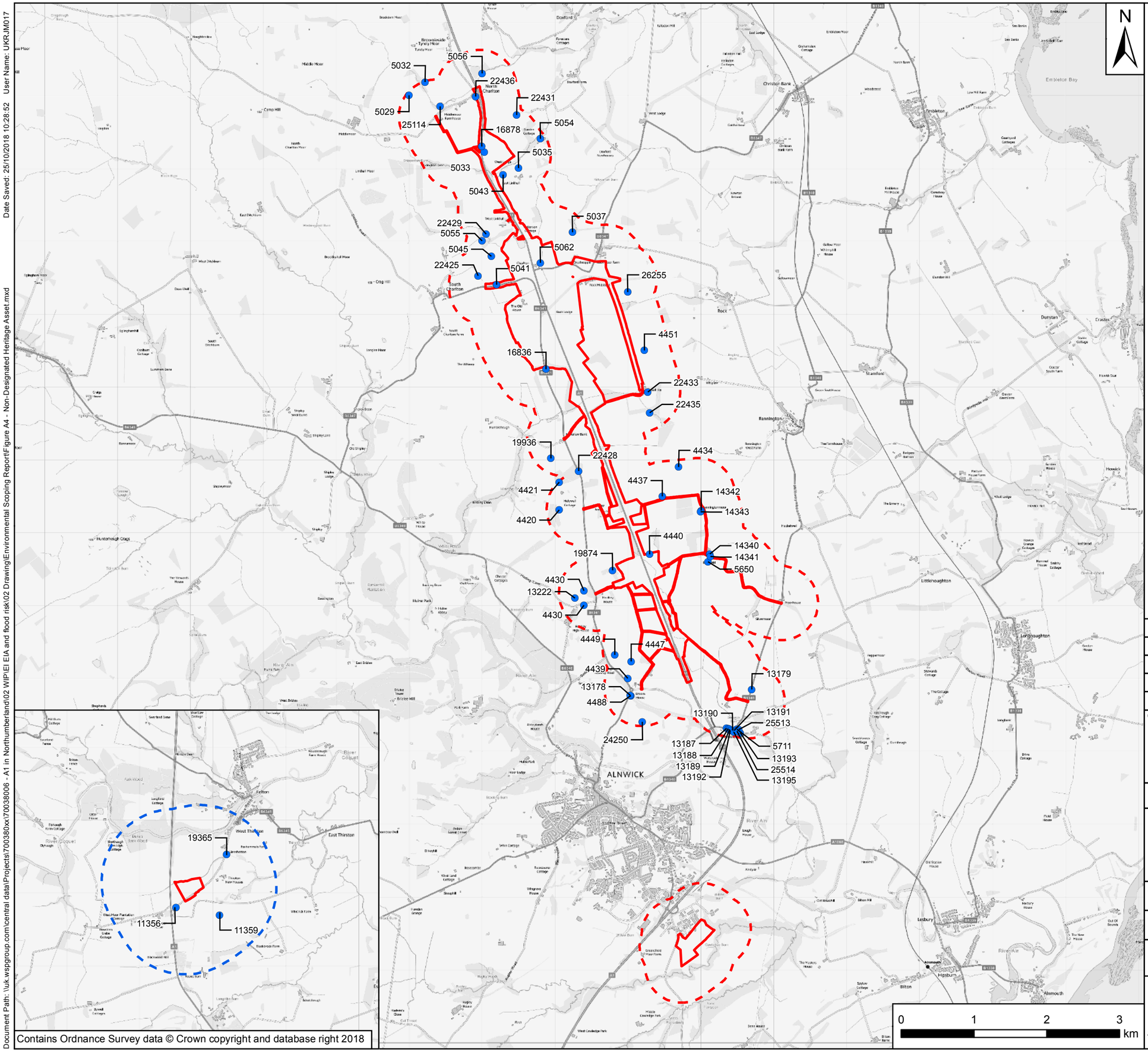

Rev	Date	Description	By	Chk'd	App'd
P01	18/10/18	First Issue	GH	SH	KS

Client: highways england

Project Title: A1 in Northumberland: Alnwick to Ellingham Scheme

Drawing Title: Figure A4 - Non-Designated Heritage Assets

Scale	Drawn	Checked	Approved	Authorised
1:50,000	GH	SH	KS	DM
Original Size	**Date**	**Date**	**Date**	**Date**
A3	18/10/18	18/10/18	18/10/18	18/10/18

Drawing Status: PO2

Suitability: S1

Drawing Number: HE551459-WSP-EGN-A2E-RP-LE-1257 (Project: HE551459 | Originator: WSP | Volume: A2E | Location | Type | Role | Number)

Project Ref. No.: 70038006

Revision: P02

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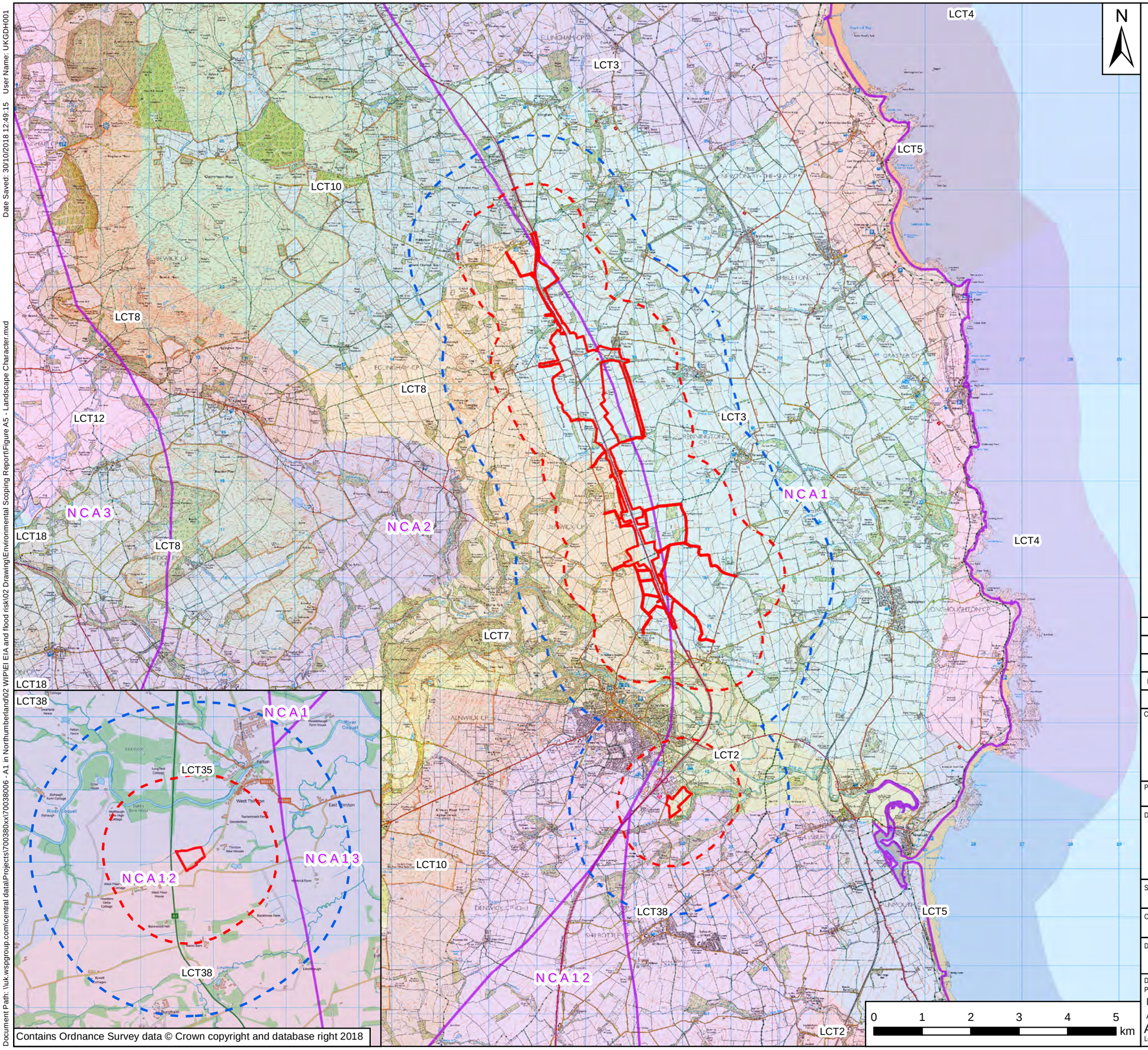

Key

- Scheme Boundary
- 1km Study Area
- 2km Study Area
- National Character Area (NCA)

Coastal Incised Valley LCT
- 2a, Lower Aln
- 2b, Lower Coquet

Farmed Coastal Plain LCT
- 3b, Lucker
- 3c, Rock

Rocky Coastline LCT
- 4b, Farne Islands Coast
- 4c, Craster Coast

Sandy Coastline LCT
- 5b, Beadnell and Embleton Bays
- 5c, Aln and Coquet Estuaries

Broad Sandstone Valley LCT
- 6a, Whittingham Vale

Estate Valley LCT
- 7a, Hulne Park

Outcrop Hills and Escarpments LCT
- 8b, Kyloe and Chillingham Hills
- 8c, Charlton Ridge
- 8d, Beanley Moor
- 8e, Rothbury Forest

Smooth Woodland LCT
- 10a, Roseborough Moor
- 10b, Alnwick Moor

Broad Lowland Valley LCT
- 35a, Coquet Valley

Lowland Rolling Farmland LCT
- 38a, Longframlington
- 38b, Longhorsley

Broad Bays and Dunes LCT
- 40a, Druridge Bay

Rev	Date	Description	By	Chk'd	App'd
P01	18/10/18	First Issue	GH	LM	KS

Client: highways england

Project Title: A1 in Northumberland: Alnwick to Ellingham Scheme

Drawing Title: Figure A5 - Landscape Character

Scale	Drawn	Checked	Approved	Authorised
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Original Size: A3	Date: 18/10/18	Date: 18/10/18	Date: 18/10/18	Date: 18/10/18

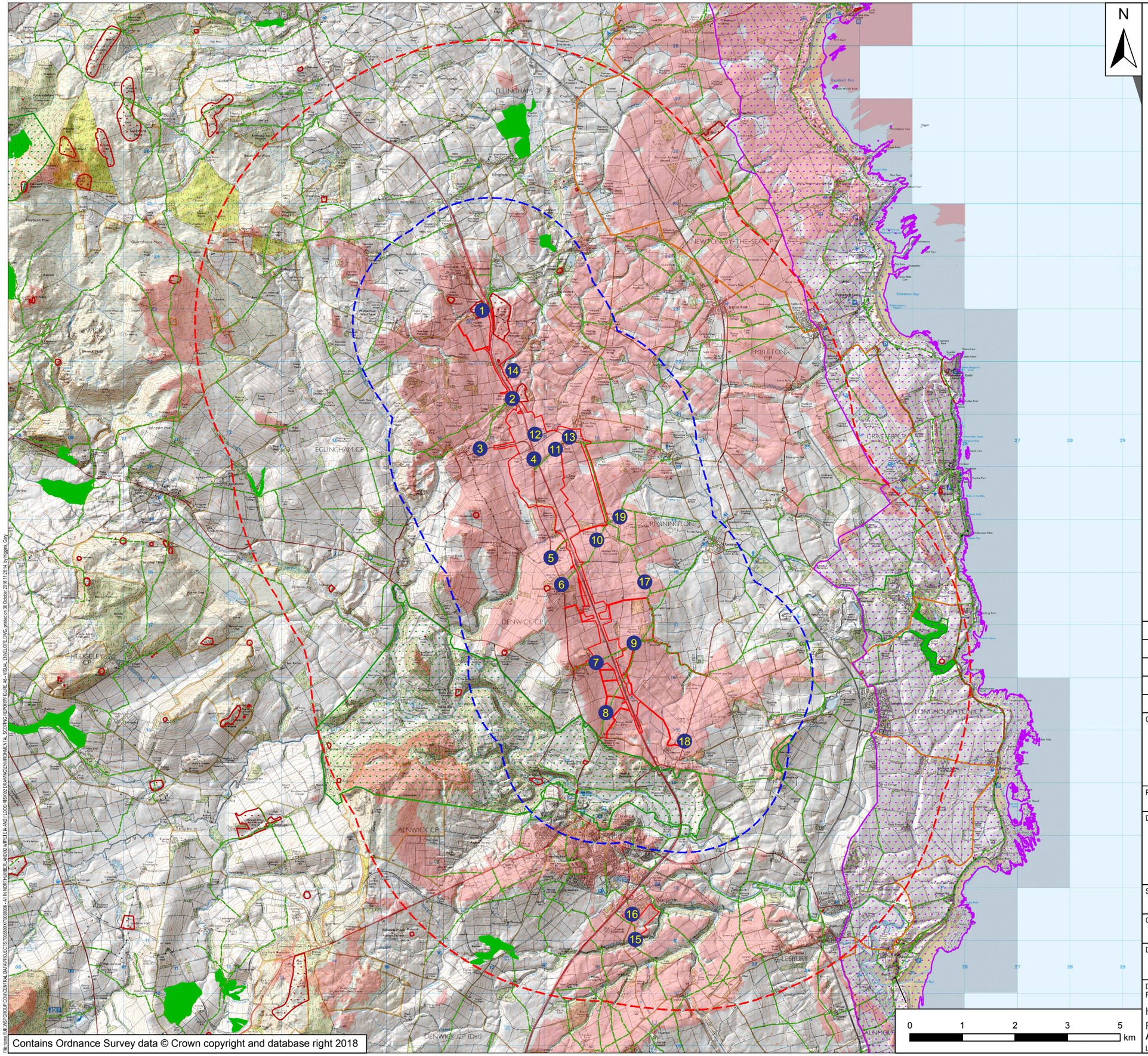
Drawing Status: PO2

Suitability: S1

Drawing Number: Project HE551459-WSP-EGN-A2E-RP-LE-1257 | Originator WSP | Volume A2E | Location | Type | Role | Number

Project Ref. No.: 70038006

Revision: P02



Rev	Date	Description	By	Chk'd	App'd
P01	18/10/18	First Issue	GH	LM	KS

Client: highways england

Project Title: A1 in Nortumberland: Alnwick to Ellingham Scheme

Drawing Title: Figure A6 - Visual Envelope

Scale	Drawn	Checked	Approved	Authorised
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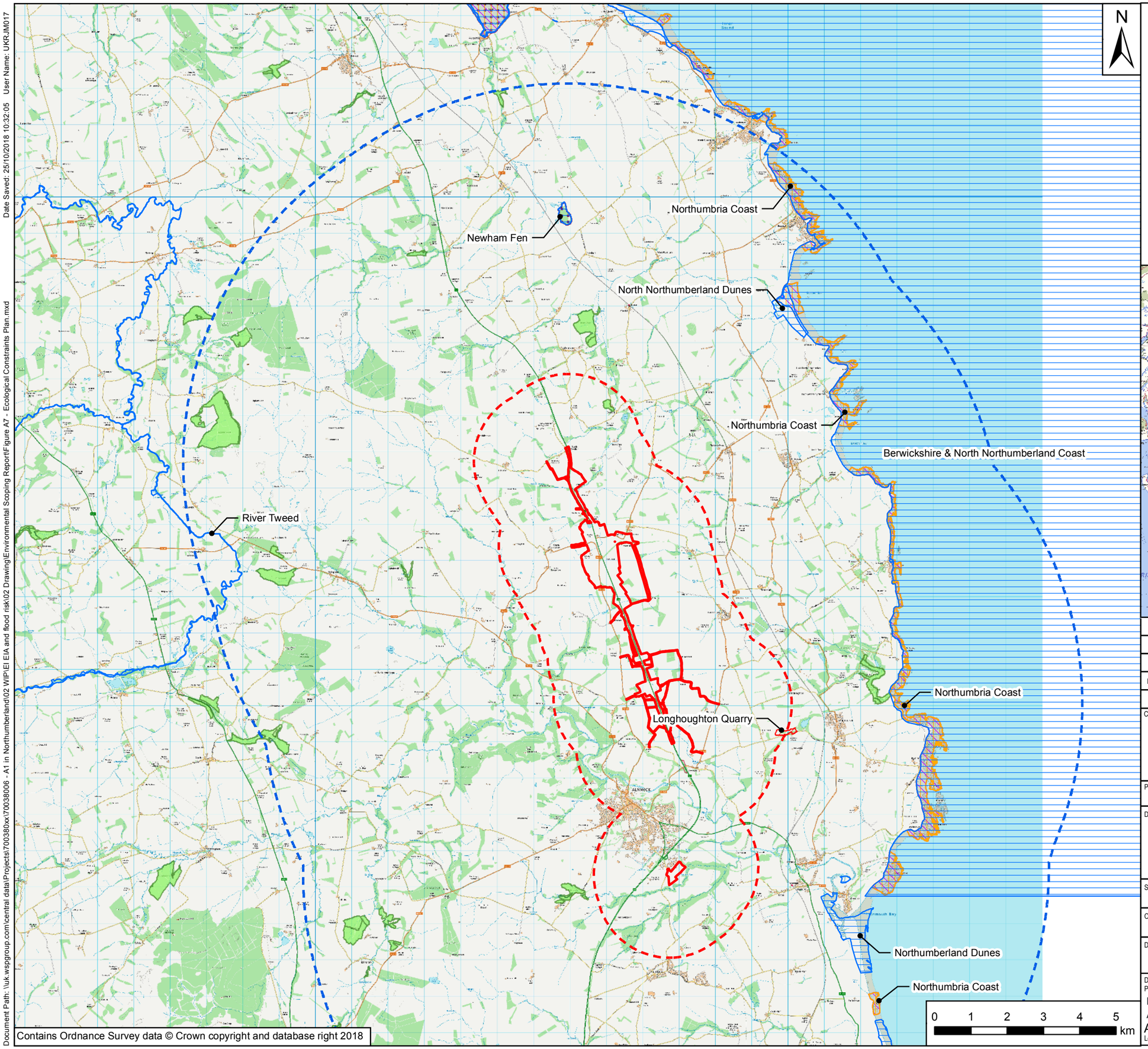
Drawing Status: PO2

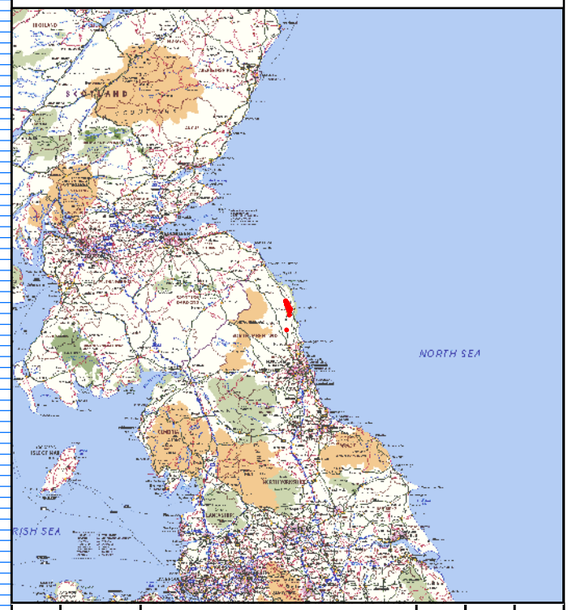
Suitability: S1

Drawing Number: Project | Originator | Volume
HE551459-WSP-EGN-A2E-RP-LE-1257 | WSP | A2E
Location | Type | Role | Number

Project Ref. No.: 70038006

Revision: P02





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Key

- Scheme Boundary
- 2km Study Area
- 10km Study Area
- Special Area of Conservation
- Special Protection Area
- Ramsar Site
- Site of Special Scientific Interest
- National Nature Reserve
- Ancient Woodland Inventory

Rev	Date	Description	By	Chk'd	App'd
P01	18/10/18	First Issue	GH	LM	KS

Client: highways england

Project Title: A1 in Northumberland: Alnwick to Ellingham Scheme

Drawing Title: Figure A7 - Ecological Constraints Plan (Page 1 of 2)

Scale	Drawn	Checked	Approved	Authorised
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Original Size: A3	Date: 18/10/18	Date: 18/10/18	Date: 18/10/18	Date: 18/10/18

Drawing Status: PO2

Suitability: S1

Drawing Number: Project HE551459-WSP-EGN-A2E-RP-LE-1257 | Originator WSP | Volume | Location A2E | Type | Role | Number

Project Ref. No.: 70038006

Revision: P02

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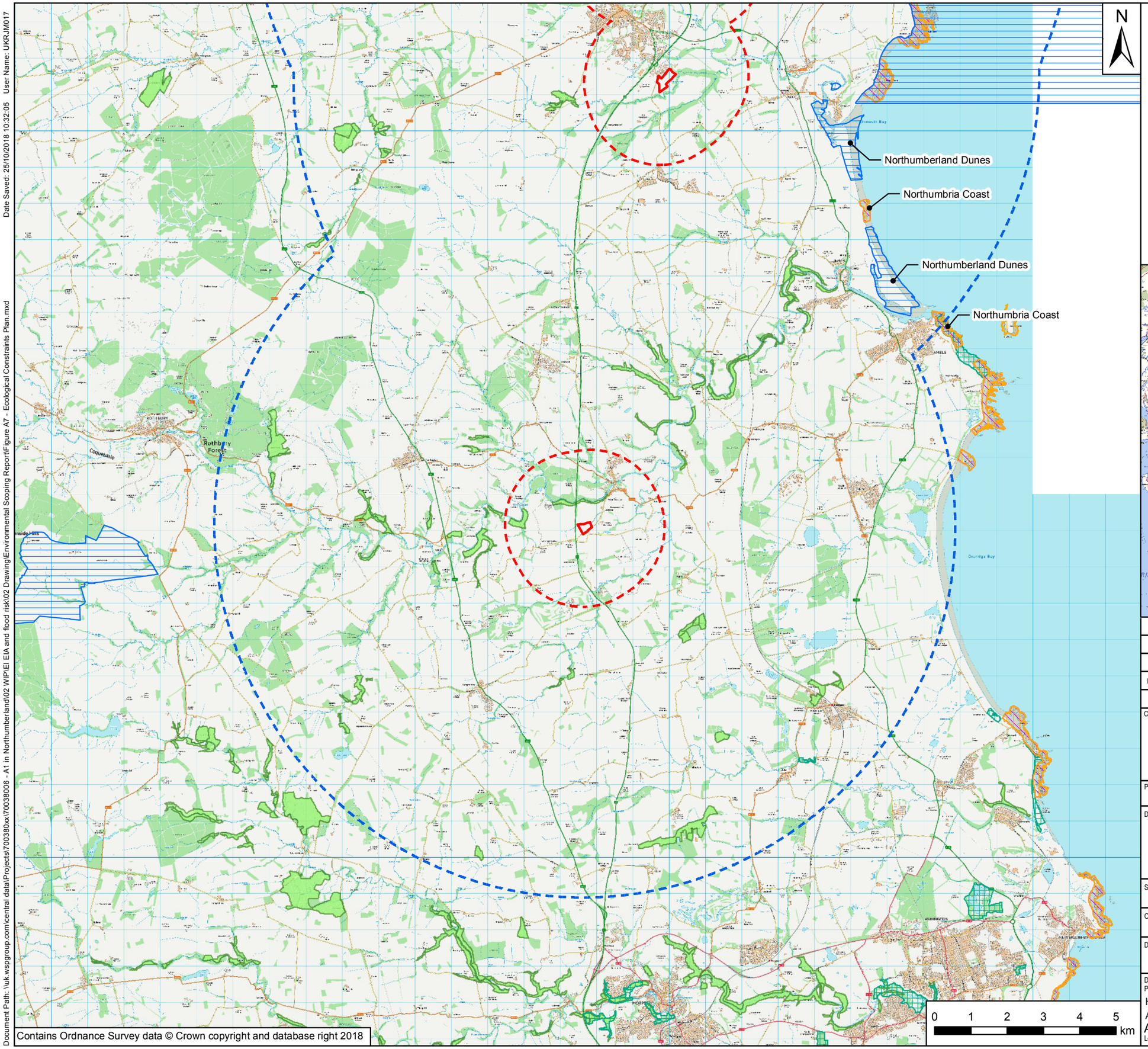

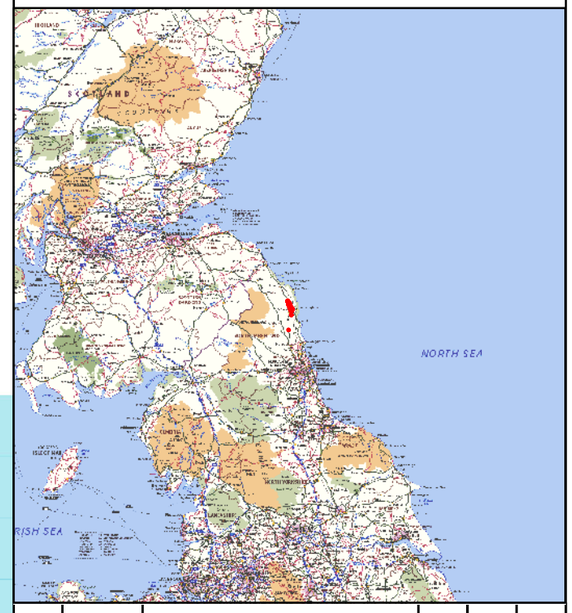

Rev	Date	Description	By	Chk'd	App'd
P01	18/10/18	First Issue	GH	LM	KS

Client

highways england

Project Title
A1 in Northumberland: Alnwick to Ellingham Scheme

Drawing Title
Figure A7 - Ecological Constraints Plan (Page 2 of 2)

Scale	Drawn	Checked	Approved	Authorised
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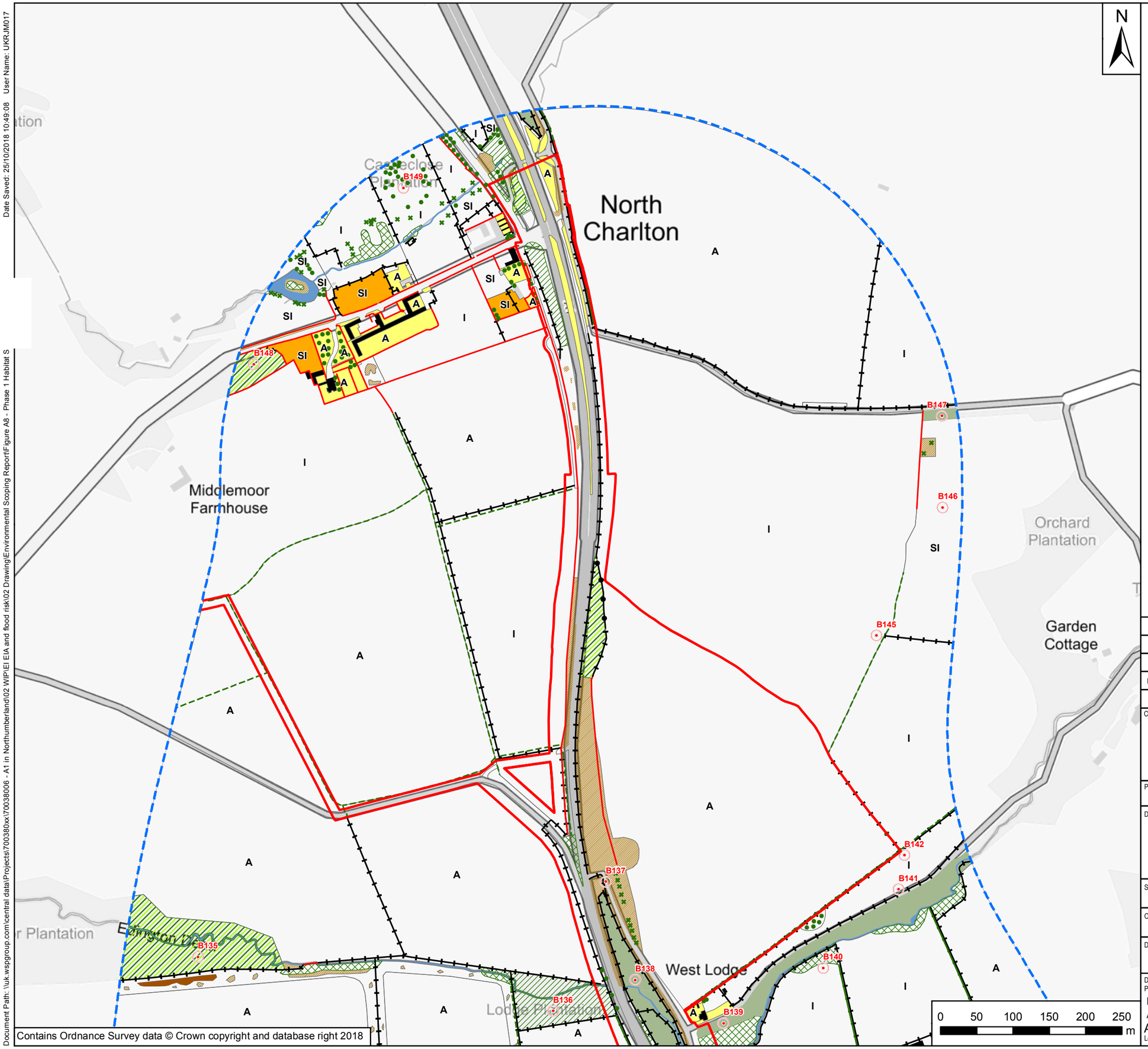
Drawing Status: PO2
Suitability: S1

Drawing Number
Project: HE551459-WSP-EGN-A2E-RP-LE-1257
Originator: WSP
Volume:
Location: A2E
Type:
Role:
Number:

Project Ref. No.: 70038006
Revision: P02



Key

- Scheme Boundary
- Survey Area
- Amenity Grassland
- Arable
- Bare Ground
- Bracken
- Broad-leaved Plantation Woodland
- Broad-leaved Semi-natural Woodland
- Building
- Coniferous Plantation Woodland
- Dense/Continuous Scrub
- Dry heath/acid grassland mosaic
- Improved Grassland
- Introduced Shrub
- Marshy Grassland
- Mixed Plantation Woodland
- Poor Semi-improved Grassland
- Scattered Scrub
- Semi-improved Neutral Grassland
- Spoil
- Standing Water
- Swamp
- Tall Ruderal
- Unimproved Neutral Grassland
- Earth Bank
- Fence
- Inland Cliff
- Native species-rich Intact Hedge
- Species-poor Defunct Hedge
- Species-poor Hedge and Trees
- Species-poor Intact Hedge
- Running Water
- Dry Ditch
- Wall
- Target Note
- Broad-leaved Scattered Tree
- Scattered Scrub

Rev	Date	Description	By	Chk'd	App'd
P01	18/10/18	First Issue	GH	NM	KS

Client: highways england

Project Title: A1 in Northumberland: Alnwick to Ellingham Scheme

Drawing Title: Figure A8 Phase 1 Habitat Survey

Scale	Drawn	Checked	Approved	Authorised
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Original Size	**Date**	**Date**	**Date**	**Date**
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Drawing Status: PO2

Suitability: S1

Drawing Number: Project HE551459-WSP-EGN- | Originator WSP | Volume A2E-RP-LE-1257 | Location A2E | Type | Role | Number

Project Ref. No.: 70038006

Revision: P02

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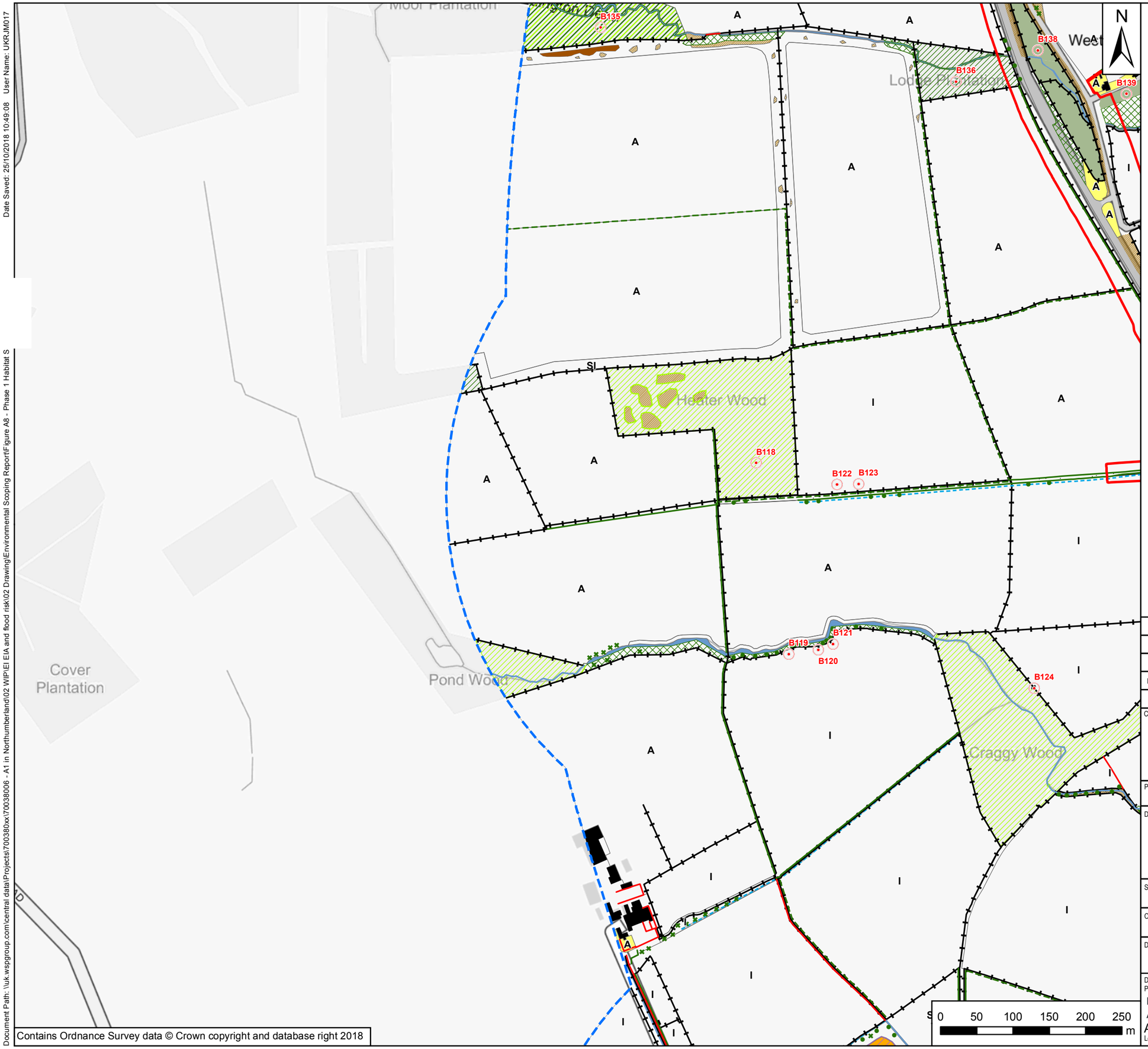

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Key

- Scheme Boundary
- Survey Area
- Amenity Grassland
- Arable
- Bare Ground
- Bracken
- Broad-leaved Plantation Woodland
- Broad-leaved Semi-natural Woodland
- Building
- Coniferous Plantation Woodland
- Dense/Continuous Scrub
- Dry heath/acid grassland mosaic
- Improved Grassland
- Introduced Shrub
- Marshy Grassland
- Mixed Plantation Woodland
- Poor Semi-improved Grassland
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- Species-poor Intact Hedge
- Running Water
- Dry Ditch
- Wall
- Target Note
- Broad-leaved Scattered Tree
- Scattered Scrub

Rev	Date	Description	By	Chk'd	App'd
P01	18/10/18	First Issue	GH	NM	KS

Client: highways england

Project Title: A1 in Northumberland: Alnwick to Ellingham Scheme

Drawing Title: Figure A8 Phase 1 Habitat Survey

Scale	Drawn	Checked	Approved	Authorised
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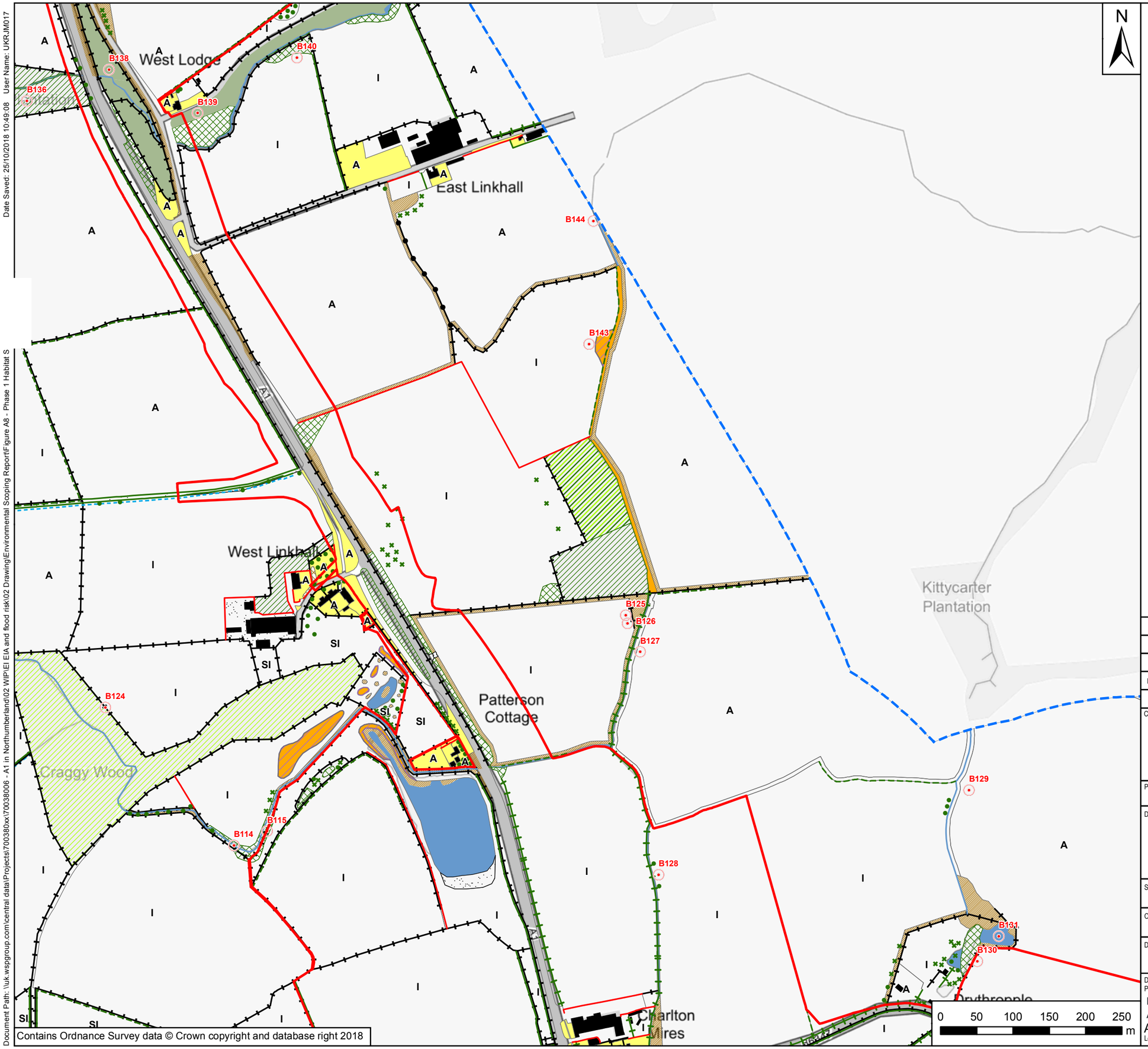
Drawing Status: PO2

Suitability: S1

Drawing Number: Project HE551459-WSP-EGN- | Originator WSP | Volume A2E-RP-LE-1257 | Location A2E | Type | Role | Number

Project Ref. No.: 70038006

Revision: P02



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Key

- Scheme Boundary
- Survey Area
- Amenity Grassland
- Arable
- Bare Ground
- Bracken
- Broad-leaved Plantation Woodland
- Broad-leaved Semi-natural Woodland
- Building
- Coniferous Plantation Woodland
- Dense/Continuous Scrub
- Dry heath/acid grassland mosaic
- Improved Grassland
- Introduced Shrub
- Marshy Grassland
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- Poor Semi-improved Grassland
- Scattered Scrub
- Semi-improved Neutral Grassland
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- Species-poor Intact Hedge
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- Wall
- Target Note
- Broad-leaved Scattered Tree
- Scattered Scrub

Rev	Date	Description	By	Chk'd	App'd
P01	18/10/18	First Issue	GH	NM	KS

Client: highways england

Project Title: A1 in Northumberland: Alnwick to Ellingham Scheme

Drawing Title: Figure A8 Phase 1 Habitat Survey

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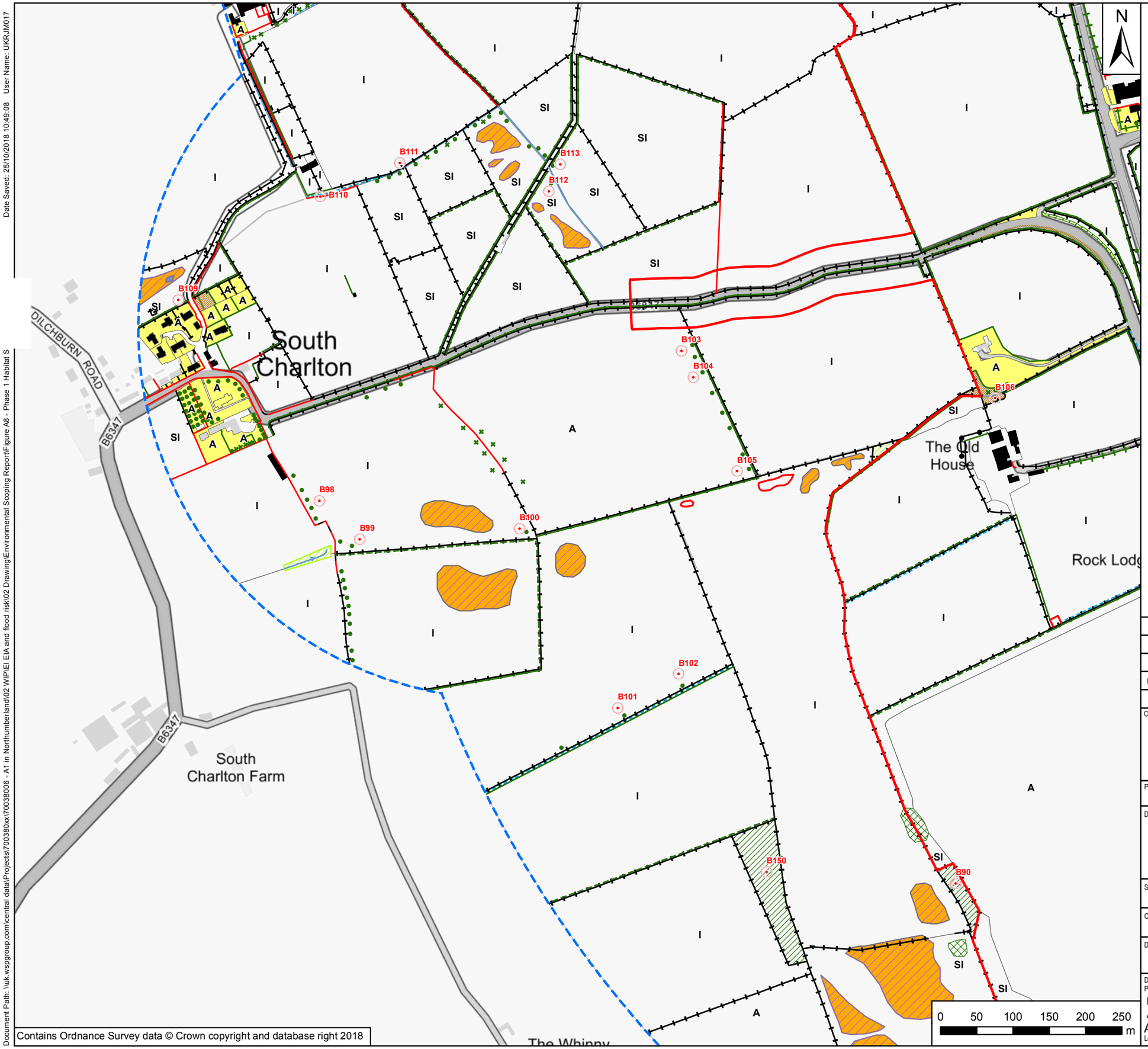
Drawing Status: PO2

Suitability: S1

Drawing Number: Project HE551459-WSP-EGN- | Originator WSP | Volume | Type | Role | Number
A2E-RP-LE-1257
A2E Location

Project Ref. No.: 70038006

Revision: P02



Key

- Scheme Boundary
- Survey Area
- Amenity Grassland
- Arable
- Bare Ground
- Bracken
- Broad-leaved Plantation Woodland
- Broad-leaved Semi-natural Woodland
- Building
- Coniferous Plantation Woodland
- Dense/Continuous Scrub
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- Semi-improved Neutral Grassland
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- Dry Ditch
- Wall
- Target Note
- Broad-leaved Scattered Tree
- Scattered Scrub

Rev	Date	Description	By	Chk'd	App'd
P01	18/10/18	First Issue	GH	NM	KS

Client: highways england

Project Title: A1 in Northumberland: Alnwick to Ellingham Scheme

Drawing Title: Figure A8 Phase 1 Habitat Survey

Scale	Drawn	Checked	Approved	Authorised
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Original Size	**Date**	**Date**	**Date**	**Date**
A3	18/10/18	18/10/18	18/10/18	18/10/18

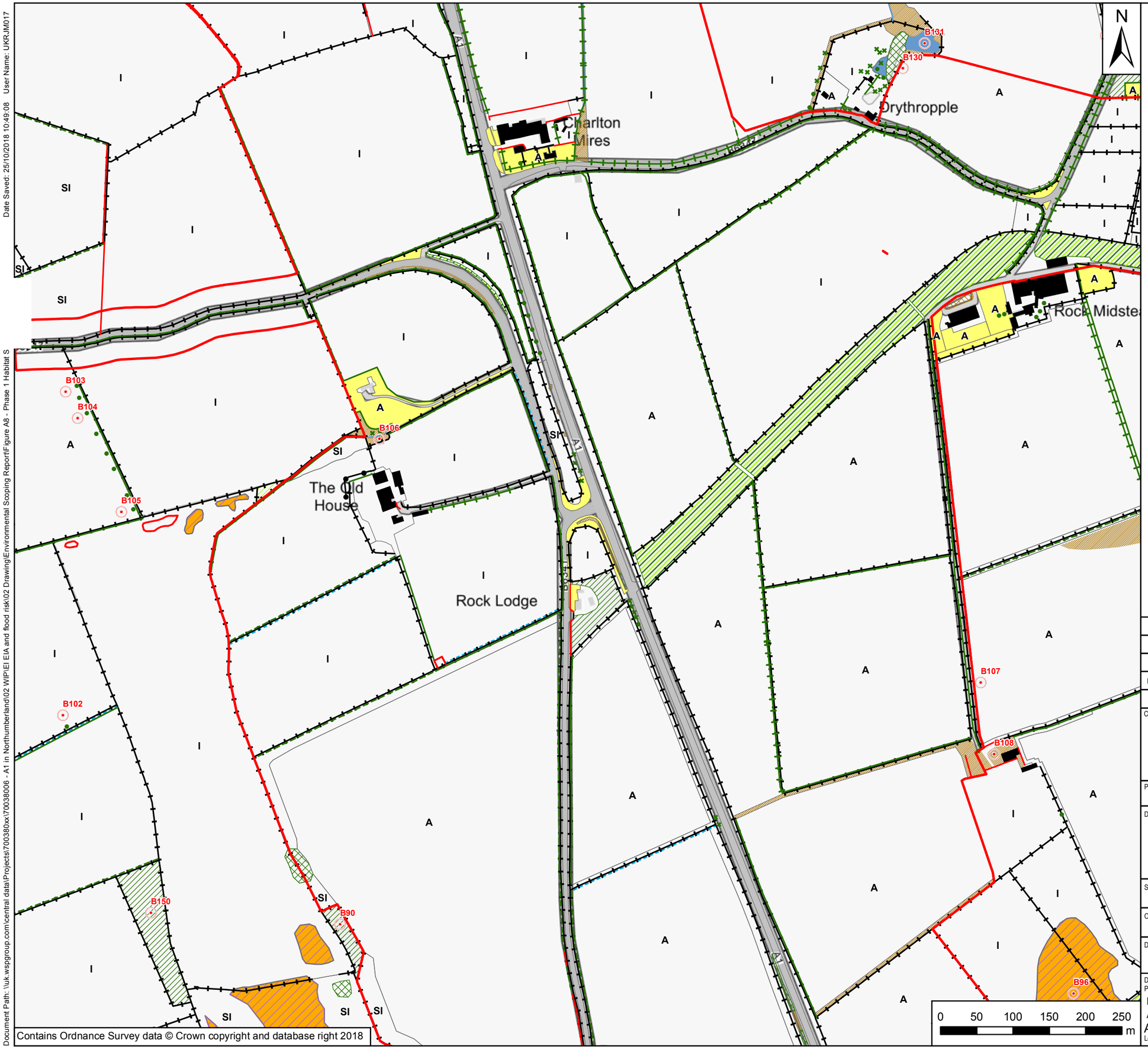
Drawing Status: PO2

Suitability: S1

Drawing Number: Project HE551459-WSP-EGN-A2E-RP-LE-1257 | Originator WSP | Volume A2E | Location | Type | Role | Number

Project Ref. No.: 70038006

Revision: P02



Key

- Scheme Boundary
- Survey Area
- Amenity Grassland
- Arable
- Bare Ground
- Bracken
- Broad-leaved Plantation Woodland
- Broad-leaved Semi-natural Woodland
- Building
- Coniferous Plantation Woodland
- Dense/Continuous Scrub
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- Introduced Shrub
- Marshy Grassland
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- Poor Semi-improved Grassland
- Scattered Scrub
- Semi-improved Neutral Grassland
- Spoil
- Standing Water
- Swamp
- Tall Ruderal
- Unimproved Neutral Grassland
- Earth Bank
- Fence
- Inland Cliff
- Native species-rich Intact Hedge
- Species-poor Defunct Hedge
- Species-poor Hedge and Trees
- Species-poor Intact Hedge
- Running Water
- Dry Ditch
- Wall
- Target Note
- Broad-leaved Scattered Tree
- Scattered Scrub

Rev	Date	Description	By	Chk'd	App'd
P01	18/10/18	First Issue	GH	NM	KS

Client: highways england

Project Title: A1 in Northumberland: Alnwick to Ellingham Scheme

Drawing Title: Figure A8 Phase 1 Habitat Survey

Scale	Drawn	Checked	Approved	Authorised
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Original Size	Date	Date	Date	Date
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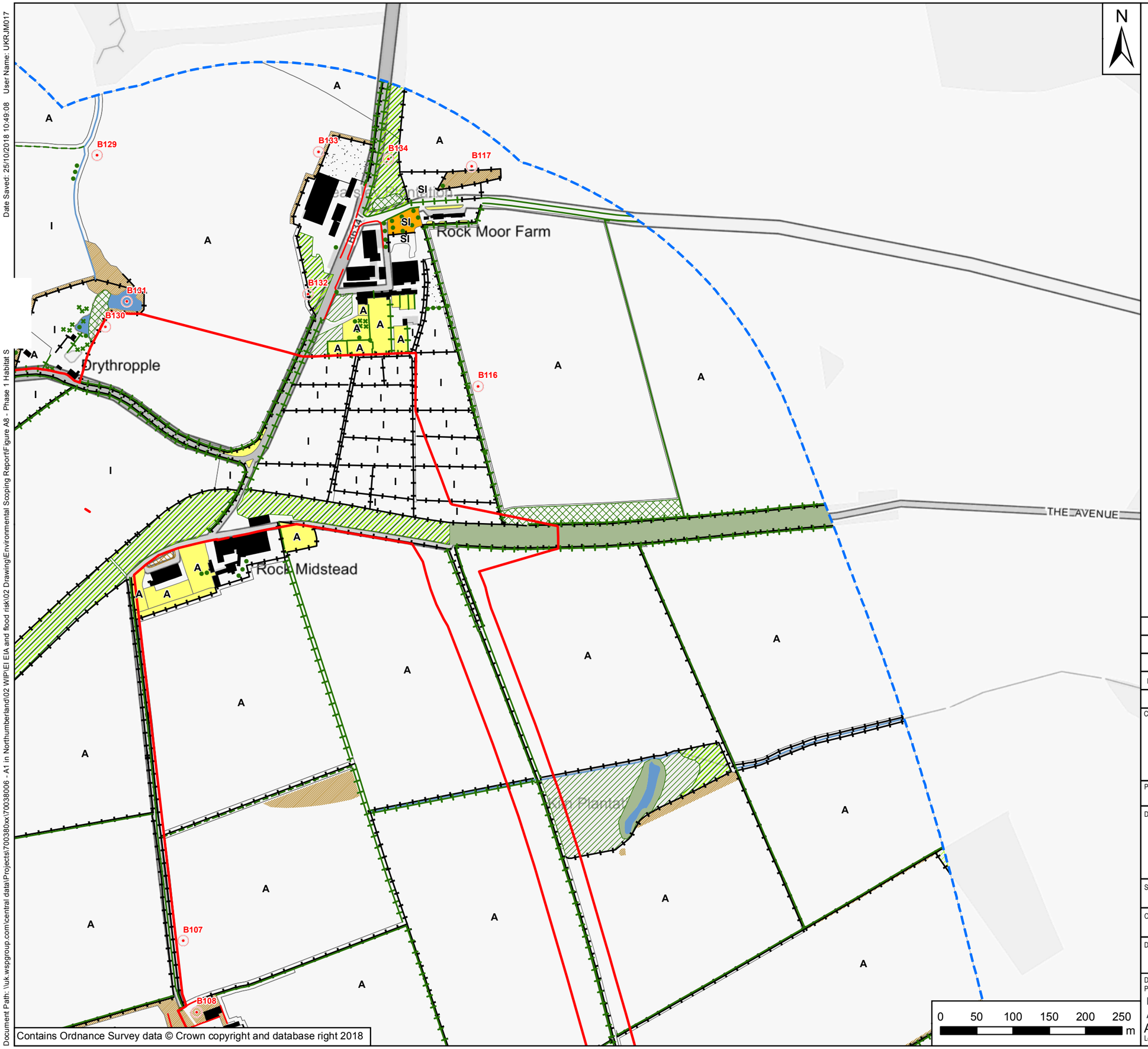
Drawing Status: PO2

Suitability: S1

Drawing Number: Project HE551459-WSP-EGN-A2E-RP-LE-1257 | Originator WSP | Volume | Location A2E | Type | Role | Number

Project Ref. No.: 70038006

Revision: P02



Key

- Scheme Boundary
- Survey Area
- Amenity Grassland
- Arable
- Bare Ground
- Bracken
- Broad-leaved Plantation Woodland
- Broad-leaved Semi-natural Woodland
- Building
- Coniferous Plantation Woodland
- Dense/Continuous Scrub
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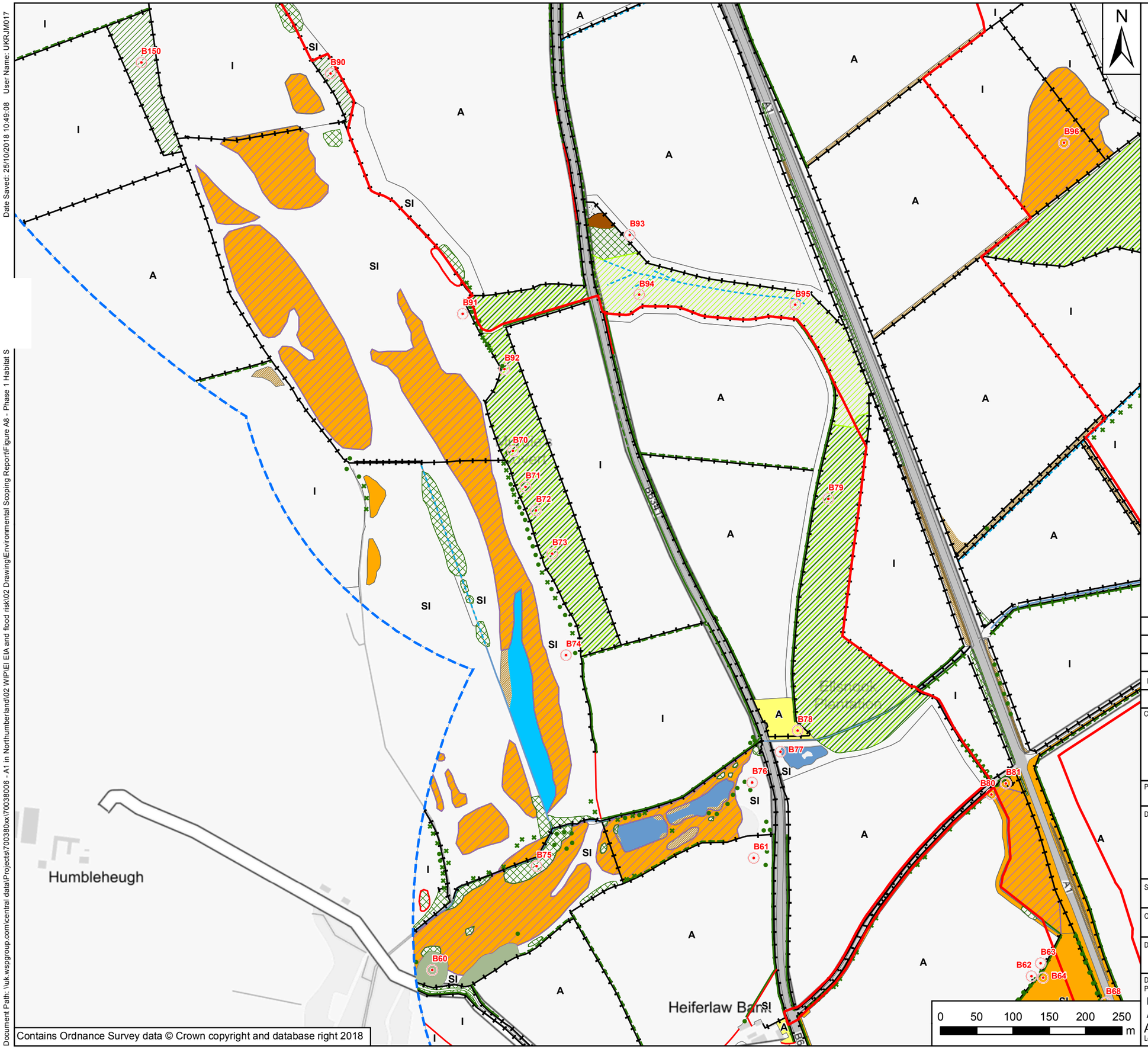

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Suitability: S1

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Location: A2E (Type | Role | Number)

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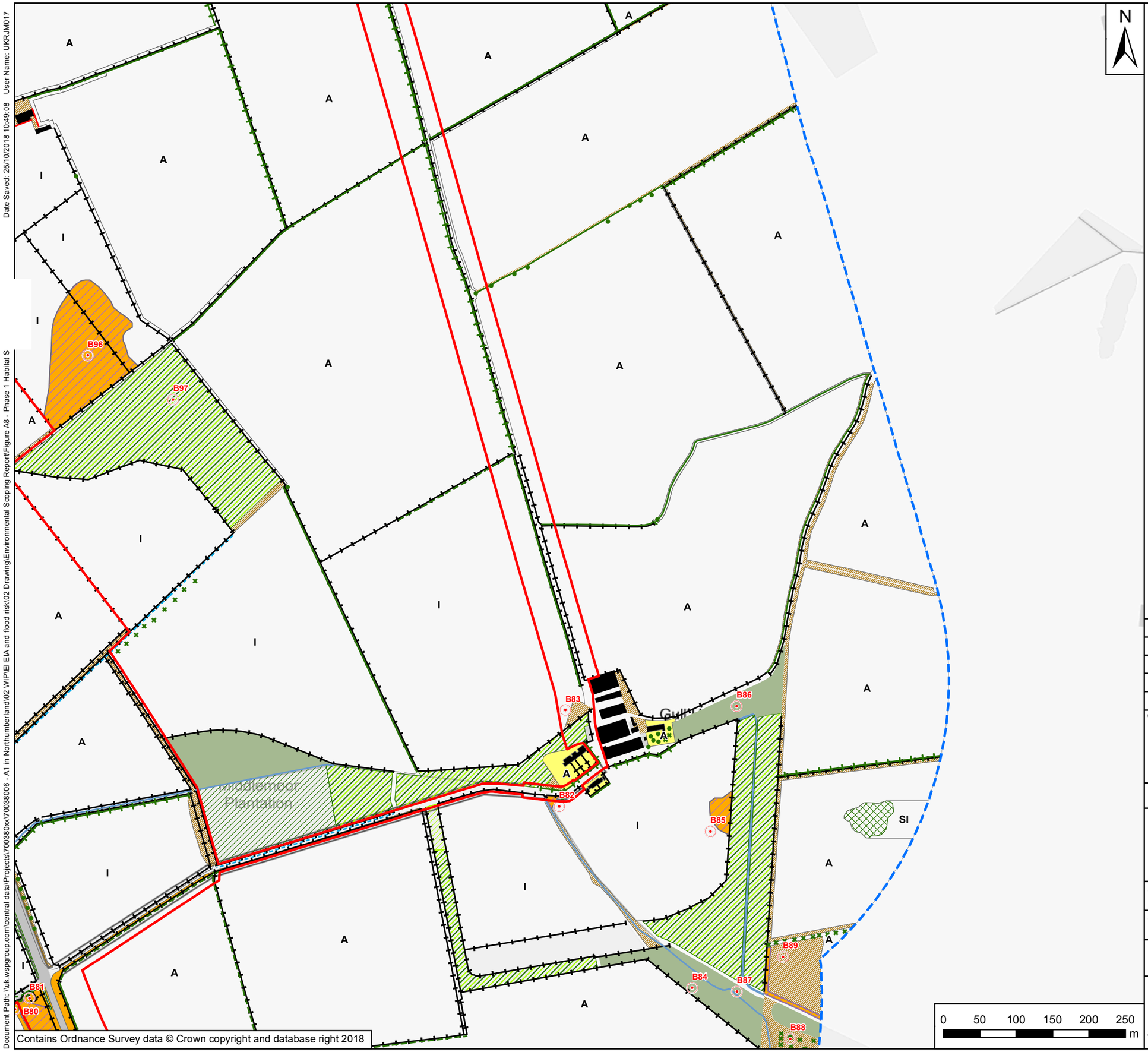
Revision: P02



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Project | Originator: WSP | Volume | Location: A2E | Type | Role | Number

Project Ref. No.: 70038006

Revision: P02

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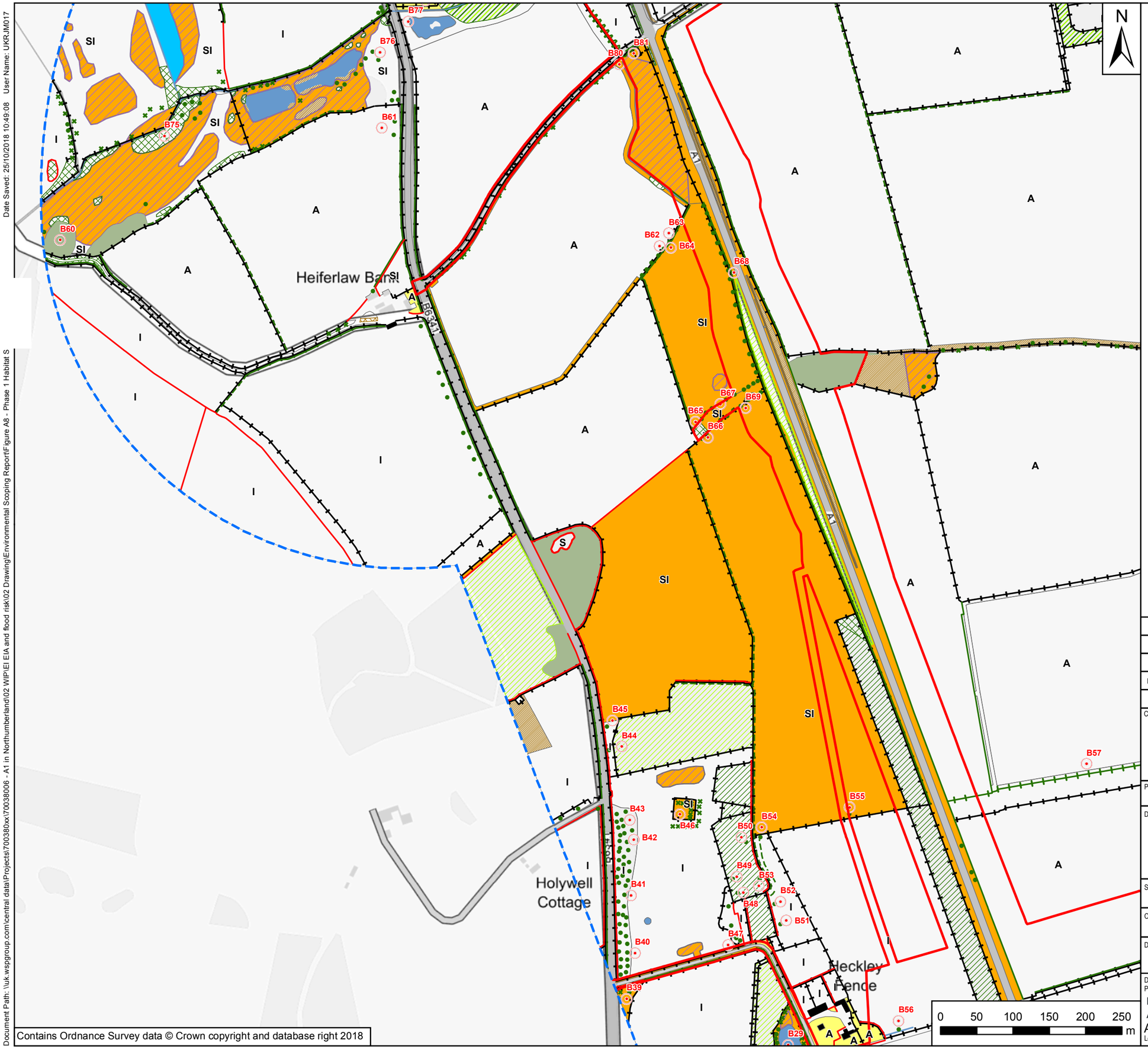

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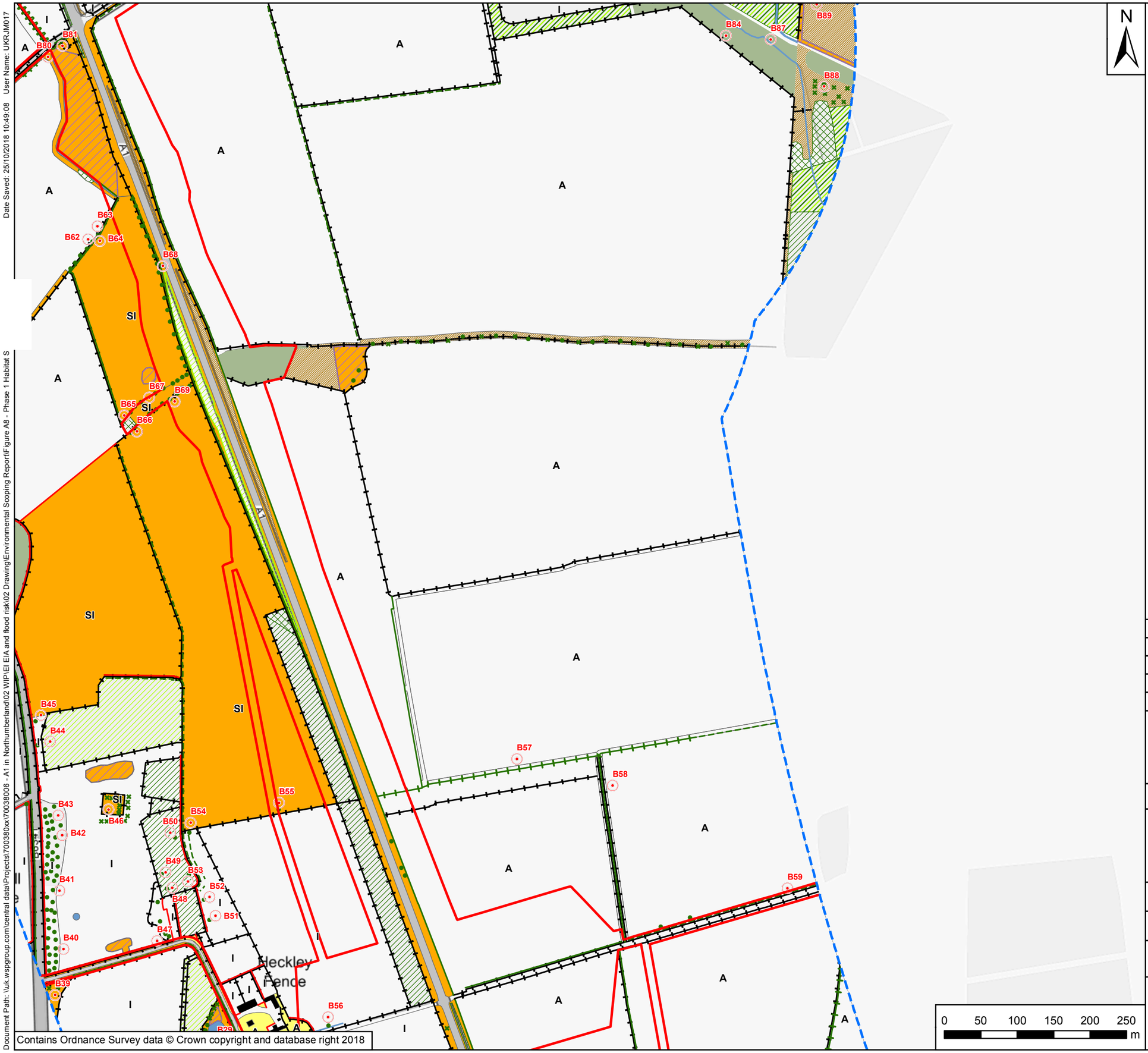

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0 50 100 150 200 250 m

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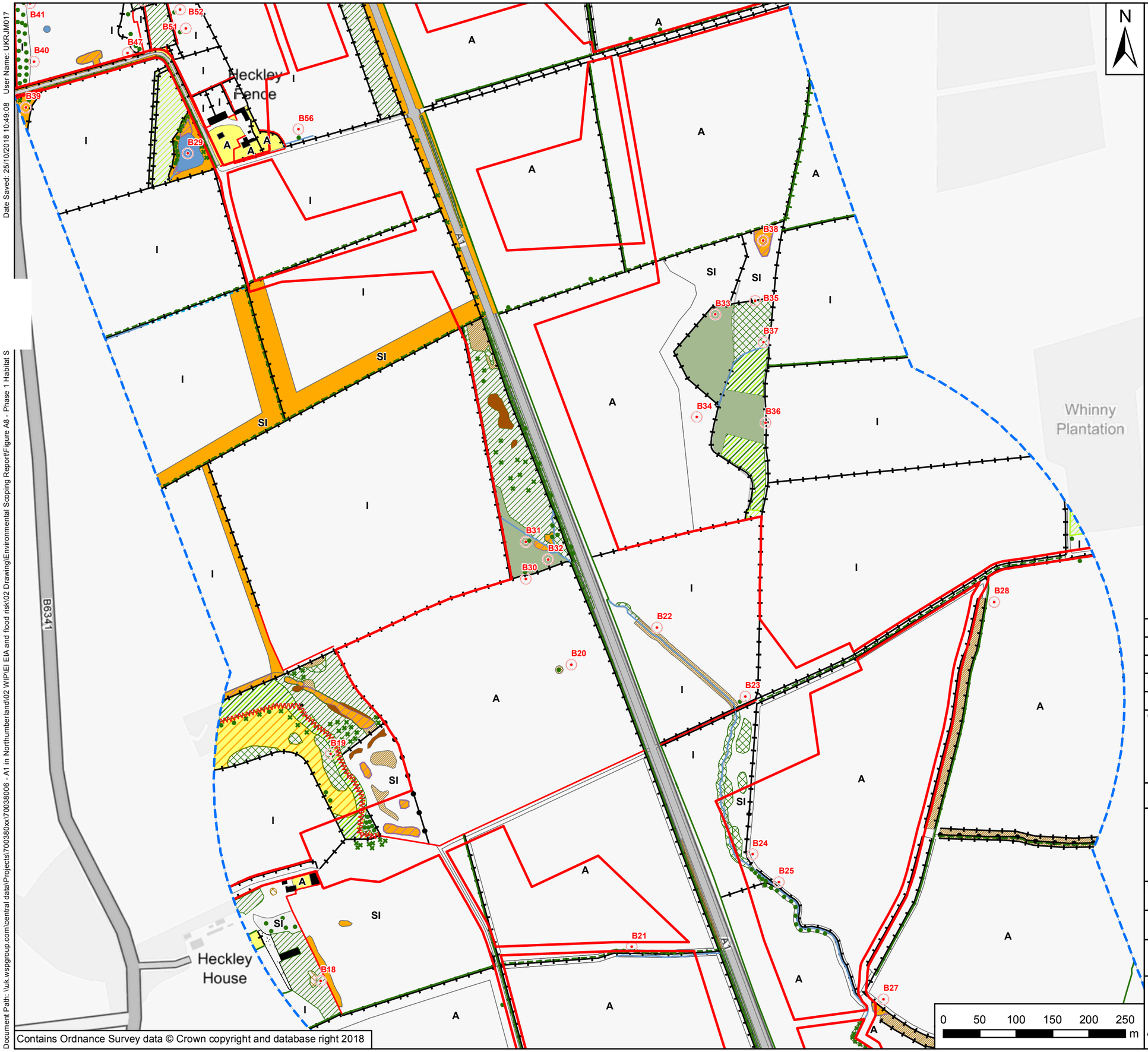
Revision: P02



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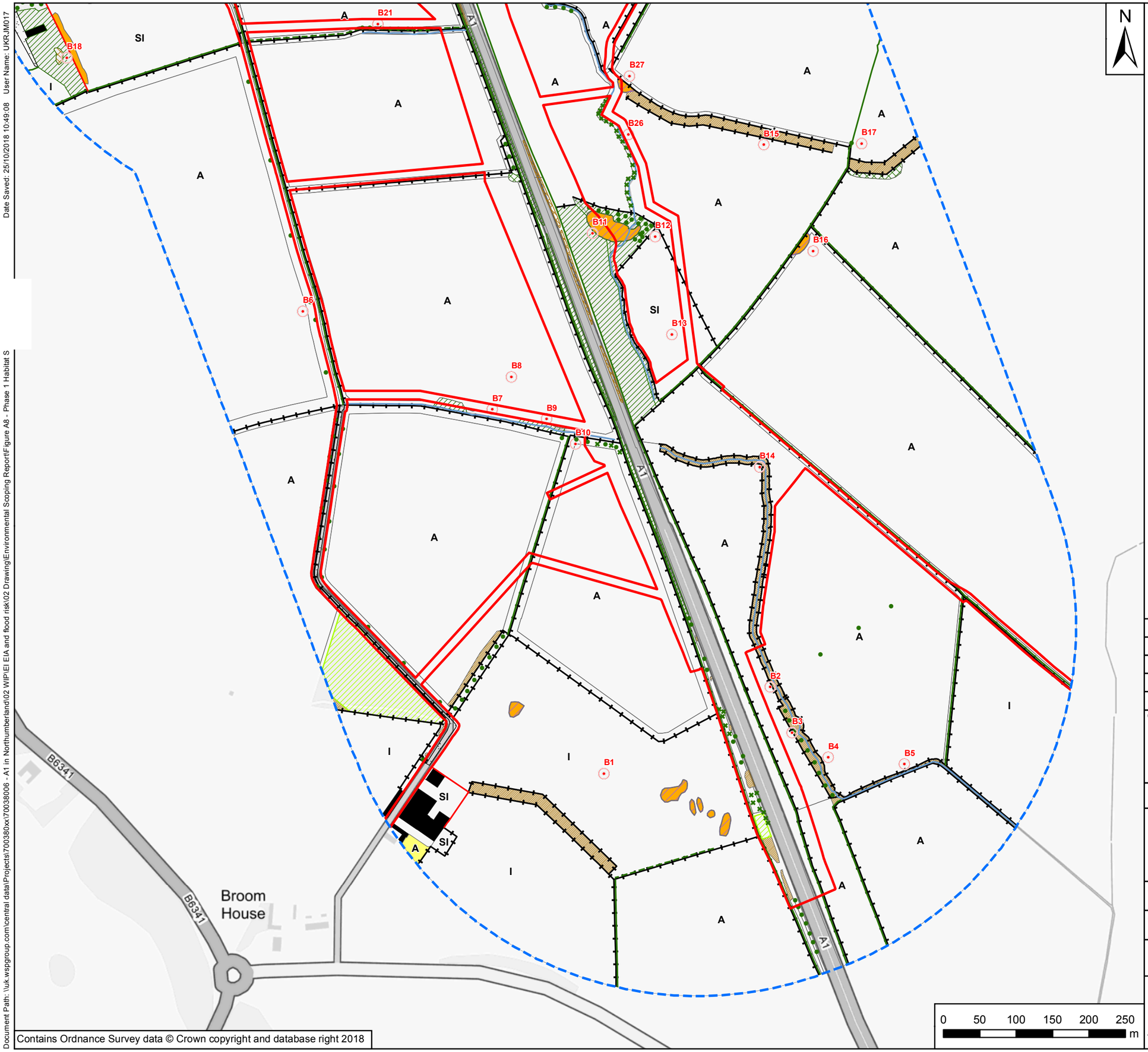
Revision: P02



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Project Ref. No.: 70038006

Revision: P02

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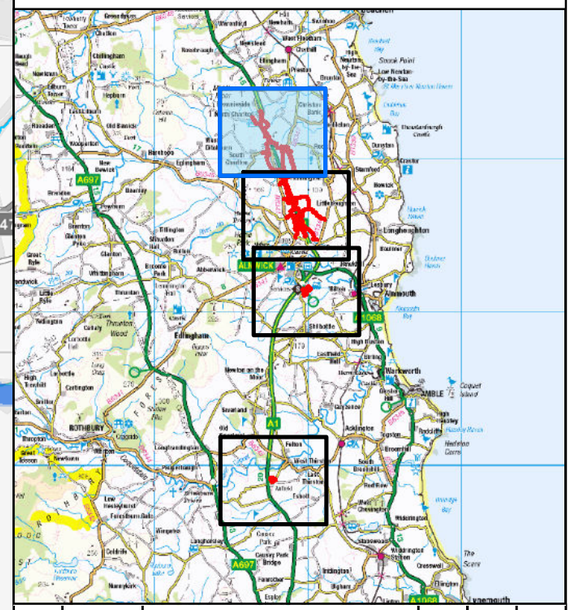
Key

- Scheme Boundary
- 500m Study Area
- Statutory Main Rivers
- Ordinary Water Courses
- Surface Water Bodies
- Flood Zone 2
- Flood Zone 3



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P01	18/10/18	First Issue	GH	SH	KS

Client: highways england

Project Title: A1 in Northumberland: Alnwick to Ellingham Scheme

Drawing Title: Figure A9 - Water Constraints Map

Scale	Drawn	Checked	Approved	Authorised
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Drawing Status: For Information

Suitability: S1

Drawing Number Project: HExxxxxx | Originator: WSP | Volume: A2E | Location | Type | Role | Number

Project Ref. No.: 70038006

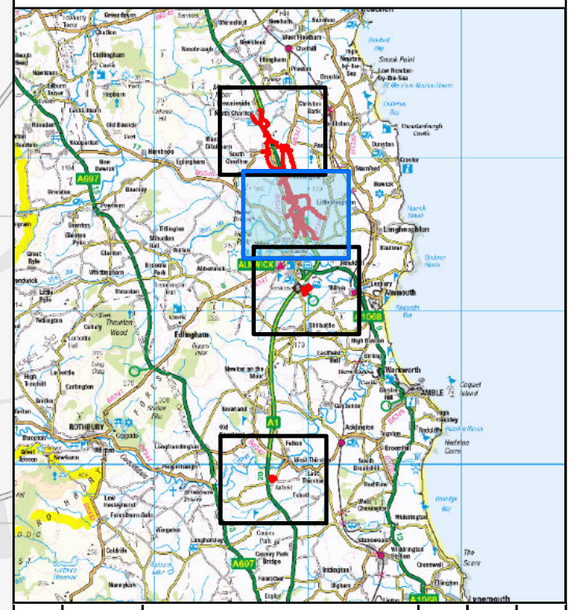
Revision: P01

0 0.5 1 km

N

Key

- Scheme Boundary
- 500m Study Area
- Statutory Main Rivers
- Ordinary Water Courses
- Surface Water Bodies
- Flood Zone 2
- Flood Zone 3



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Client: highways england

Project Title: A1 in Northumberland: Alnwick to Ellingham Scheme

Drawing Title: Figure A9 - Water Constraints Map

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Drawing Status: PO2

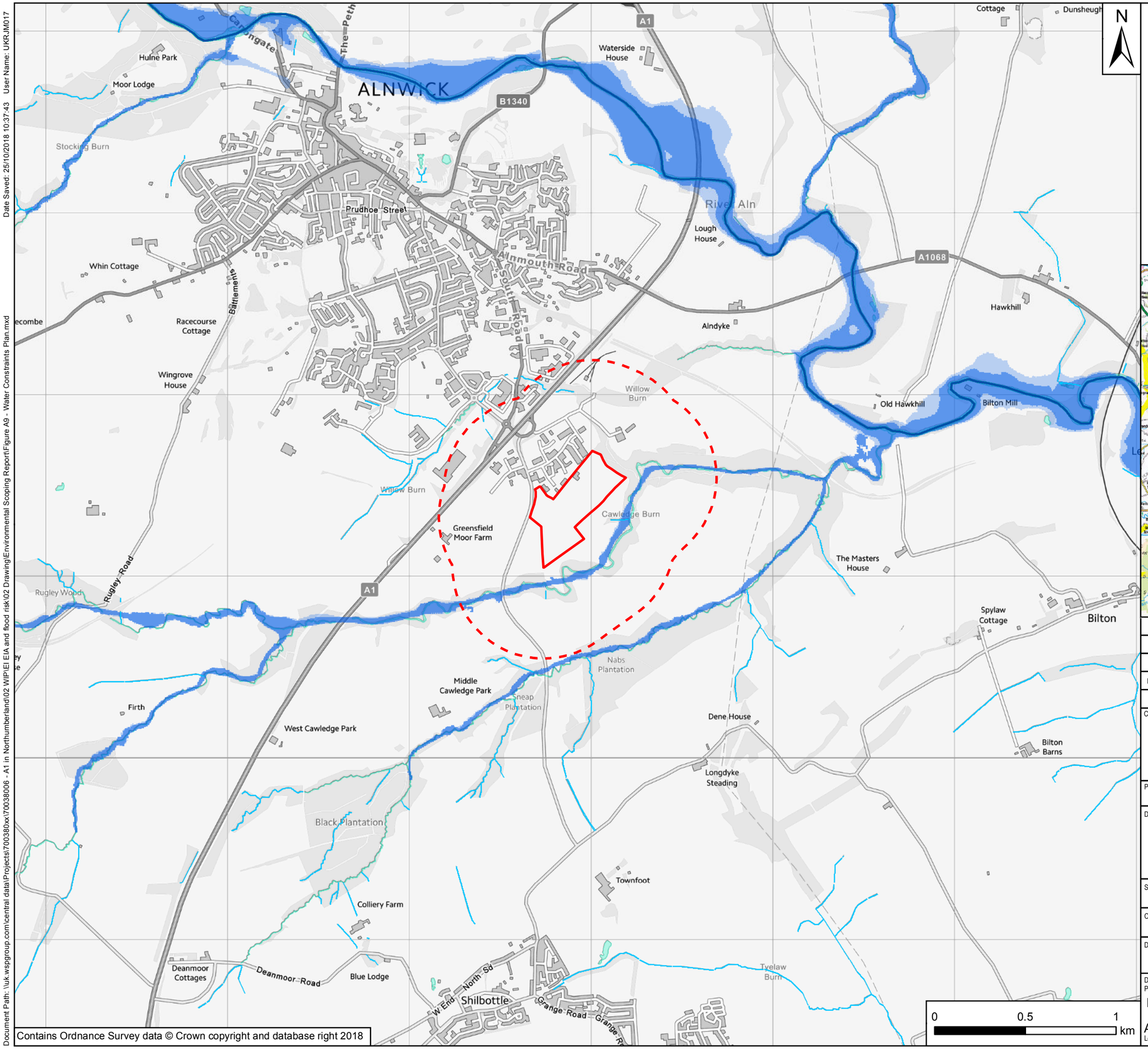
Suitability: S1

Drawing Number: HE551459-WSP-EGN-A2E-RP-LE-1257 (Project | Originator: WSP | Volume | Location: A2E | Type | Role | Number)

Project Ref. No.: 70038006

Revision: P02

0 0.5 1 km



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Drawing Status: For Information

Suitability: S1

Drawing Number: Project HExxxxxx | Originator WSP | Volume | A2E Location | Type | Role | Number

Project Ref. No.: 70038006

Revision: P01

Swarland Mill
Mill Burn Cottage
Swarland Fence
B6345
Swarland Dene
Shortlaw Cottage
The Lodge
High Park
Minto's Dean
Main Street
Mouldshaugh Farm House
River Coquet
Felton Fence
Park Wood
Longfield Cottage
Felton
The Pelt
B6345
Otter House
Elyhaugh Farm Cottage
River Coquet
Elyhaugh
Shothaugh Farm High Cottage
Duke's Bank Wood
West Thirston
B6345
East Thirston
Thirston Burn
B6345
Foxhemmels Farm
Glenshotton
Thirston New Houses
Brocks Cottage
The Brocks
Wintrick Farm
West Moor Plantation Cottage
West Moor House
Howdens Glebe Cottage
A1
Blackbrook Farm
Blackwood Hall
Rosies Barn
Westfield House
Eshott
Longdike Burn
Eshottheugh
Bywell Cottages
Burgham
Dormy House
Linden Hall
Helm Cottage
Longdyke
Forest W

N

Key

- Scheme Boundary
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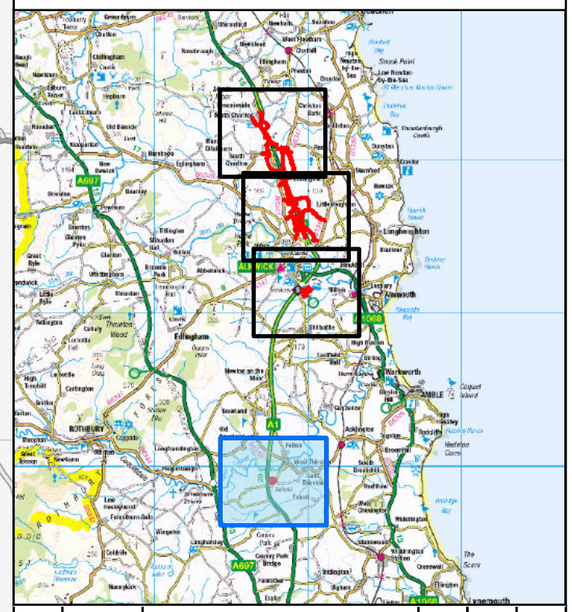
0 0.5 1 km



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Drawing Number: Project HE551459-WSP-EGN- | Originator WSP | Volume A2E-RP-LE-1257 | Location A2E | Type | Role | Number

Project Ref. No.: 70038006

Revision: P02

Appendix B

TRANSBOUNDARY EFFECTS SCREENING MATRIX

Criteria	Relevant Considerations
Characteristics of the development	The Scheme includes approximately 8 km of online widening between the single carriageway north of Denwick to the dual carriageway south of Brownieside to create a dual carriageway, which would comprise: • Approximately 8 km of online widening; • Junction improvement at South Charlton; • An accommodation bridge near Broxfield; • Private Means of Access; • Drainage works; • Additional culverts within watercourses and extension of existing culverts; • Statutory Diversions; • Signage; • Lighting; • Temporary diversions of Public Rights of Way during construction and permanently during operation; • Temporary site construction compounds; • Traffic Management Systems during construction; and • Soil storage areas, Some of the resources required for the construction of the Scheme are likely to be obtained from the global market, e.g. steel, but it is likely that materials would be obtained locally wherever possible. No waste, nuisances or accidents are likely that would extend beyond the border of the UK. No novel technologies are proposed that have potential for transboundary impacts.
Geographical area	It is not anticipated that any impacts are likely to extend beyond the jurisdiction of the UK, with the exception of the potential release of greenhouse gas emissions (as discussed in Chapter 15 of this Scoping Report).
Location of the development	The Scheme is located in Northumberland, North East England, crossing predominantly rural existing land uses. The Scheme is located wholly within the UK. The Scheme is not part of the Trans-European transport network. The closest EAA state is Ireland, approximately 350 km west of the Scheme.
Cumulative Impacts	Chapter 16 of the Scoping Report identifies a number of cumulative developments proposed in the area surrounding the Scheme. Additionally, the Highways England A1 in Northumberland: Morpeth to Felton project is located approximately 12 km south of the Scheme. The traffic model developed to assess impacts for the Scheme includes assumptions on traffic generation from proposed development in the area. The potential cumulative effect upon transport emissions from the Scheme and proposed development will therefore be accounted for in the Scheme Environmental Impact Assessment. However, it is not anticipated that there is potential for cumulative transboundary effects from these developments other than greenhouse gas emissions.
Carrier	Impacts arising from greenhouse gas emissions would be carried by air.
Environmental importance	Chapter 8 of the Scoping Report reports that there are areas of high landscape value in the vicinity of the Scheme. However, it is not anticipated that the Scheme would have a significant effect on landscape during both the construction and operation of the Scheme.

	As described in Chapter 10, five designated sites of European or International importance are located within 10 km of the main areas of works. It is anticipated that the Scheme would have no significant effects on the designated statutory and non-statutory site of importance. As reported in Chapter 11, seven watercourses and/or tributaries within 500 m of the Scheme (permanent area of works, Main Compound and Lionheart Enterprise Park Compound) are assessed by the Environment Agency in accordance with the objectives of the Water Framework Directive. It is anticipated that the Scheme could have significant effects on the surface water features. No environmental values of other EEA states will likely be impacted.
Extent	The only pathway of potential effect to another EEA Member State would be the release of greenhouse gas emissions. With the consideration of the design measures built into the Scheme and the implementation of mitigation measures and best practice (in line with regulatory body requirements), it is not anticipated that the release of greenhouse gas emissions would have a significant impact on another EEA Member State.
Magnitude	The likely magnitude of change to greenhouse gas emissions would be negligible, on the basis that the UK's construction industry emits approximately 101.1 m tonnes of carbon dioxide equivalent gases (2011 data, ONS) and the UK as a whole emitted 634.8 m tonnes of carbon dioxide equivalent. The Scheme would make a negligible contribution to the overall amount. It is proposed to calculate the likely greenhouse gas emissions as part of the EIA.
Probability	The probability of the Scheme to contribute to greenhouse gas emissions is likely and would occur as a consequence of the construction processes and typical operating conditions of such a Scheme.
Duration	The impact of greenhouse gas emissions is likely to occur during both construction and operation of the Scheme and be a long-term negligible impact.
Frequency	The frequency of impact is likely to be constant.
Reversibility	The impact is considered irreversible within human lifetimes.

Appendix C

DETAILED LANDSCAPE CHARACTER INFORMATION

DETAILED LANDSCAPE CHARACTER INFORMATION

National Character Areas

The key characteristics of NCA2 (**Ref 8.10**) as set out in the Natural England National Character Area Profile (**Ref 8.8**) are:

- *"Arc of sandstone hills forming distinctive skyline features including the iconic monolith of Simonside, characterised by generally level tops, north-west facing scarp slopes and craggy outcrops.*
- *Exceptional panoramic views of the coast and across the lowland Cheviot Fringe to the Cheviots and Scotland.*
- *Heather and grass moorland provides rough grazing on the upper slopes and broad tops of the ridges, interrupted by large geometric conifer plantations, giving way to improved pasture and cropping on lower slopes and valley bottoms.*
- *A mixture of piecemeal and regular enclosure, bounded by drystone walls but often broken up by coniferous shelterbelts and blocks, especially in areas of regular enclosure.*
- *Wide valleys of the Coquet and Aln rivers pierce the arc of hills, containing remnant native woodland and a patchwork of wet pastures and arable fields, often with steep-sided bluffs and fed by incised tributaries.*
- *Wet peaty flushes, mires, loughs, lakes and small reservoirs occur throughout the area.*
- *Broadleaved woodland is associated with rivers, burns, loughs, scarp slopes and country house estates.*
- *Nationally and internationally important species including Atlantic salmon, brook and river lamprey, otter, water crowfoot, hen harrier, peregrine, merlin, ring ouzel, black grouse, whinchat, golden plover, dunlin, curlew, nightjar and red squirrel.*
- *A number of large country houses set in extensive gardens and parklands with associated broadleaved woodland fringe the lower slopes.*
- *Important and complex archaeological landscape, with prehistoric 'cup and ring' marked rocks, bronze-age burial cists, earthwork remains of later iron-age hill fort systems, standing stones, enclosures and cairns, extensive medieval remains, bastles and castles such as Alnwick Castle, and evidence of quarrying.*
- *Scattered pattern of individual isolated farmsteads and small hamlets, served by the main market town of Alnwick and smaller service centre of Rothbury. Buildings constructed from locally quarried dressed or rubble sandstone, with slate roofs.*
- *Tranquil, rural landscape with low population and a few strategic major roads but with increasing numbers of vertical structures such as communications masts and wind turbines prominent on the skyline.*
- *Moorlands, forests and sandstone outcrops provide important recreational opportunities for activities such as walking, biking, climbing and wildlife watching."*

The key characteristics of NCA 1 (**Ref 8.9**) as set out in the Natural England National Character Area Profile (**Ref 8.8**) are:

- *"Narrow, low-lying coastal plain with wide views east of the coast and out to sea, and west to the Northumberland Sandstone Hills and Cheviots.*
- *Carboniferous sandstones, limestones and shales characterise much of the area with Whin Sill intrusions producing dramatic landscape features such as the coastal cliffs at Bamburgh and the Farne Islands and distinctive inland local landmarks, and supporting rare, semi natural Whin grasslands.*
- *Diverse coastal scenery with the 'hard' coast of spectacular high cliffs, offshore islands and rocky headlands contrasting with the 'soft' coast of sweeping sandy bays, sand dunes, mudflats and salt marsh.*
- *The rivers Tweed, Aln and Coquet, as well as numerous smaller watercourses, meander across the coastal plain to the sea.*
- *Farmed landscape of predominantly large, open arable fields and permanent pasture, with some remnant semi-natural grassland in the valleys and coastal fringes. Fields are bounded by low, often fragmented hedgerows, grey sandstone walls and post-and-wire fences.*
- *Limited woodland cover confined to small but prominent blocks and shelterbelts adjacent to farmsteads and settlements, with larger areas of mixed broadleaved woodland in the river valleys and around the Howick estate.*
- *Holy Island, the Farne Islands and stretches of coast including the estuaries support internationally important habitats, bird populations and grey seals.*
- *Prominent and distinctive medieval castles, fortifications and religious buildings reflect the historic importance of ecclesiastical influences and the strategic defence of the coast and Anglo-Scottish border.*

- *Long history of mineral extraction including whinstone, sandstone and limestone quarrying, and open cast coal mining to the south-west of Berwick-upon-Tweed.*
- *Dispersed pattern of isolated large-scale farmsteads, small nucleated villages, fishing villages and small coastal resort towns, with buildings often single storey and commonly constructed from local sandstone with roofs of blue slate or red clay pantiles.*
- *Coastal trails, wildlife and historic sites attract large numbers of visitors to this popular area of coast, with access provided by the A1 and East Coast Main Line."*

Regional Landscape Character Areas

The key characteristics of Farmed Coastal Plain LCT are given as:

- *"Open, coastal location, although sea views are not always possible.*
- *Gently rolling or almost flat farmland, dominated by large arable fields.*
- *Generally low-lying, with some small hills and raised plateaux.*
- *Intensive farmland, often with weak field boundary pattern.*
- *Occasional wooded estates.*
- *Large farmsteads comprising traditional and modern buildings.*
- *Belts of coniferous shelterbelts and deciduous woodland."*

The character of 3c Rock LCA are described in further detail:

- *"This area is similar to 3b, but is generally more wooded. The transition is gradual, but this area is characterised by coniferous shelterbelts and deciduous woodland strips. Hedgerows are more common, although their condition remains variable. Belts of Scots pine are a distinctive feature. Estate influences occur at Rock House and Howick Hall, resulting in a more intimate landscape experience."*

The key characteristics of Outcrop Hills and Escarpments LCT are given as:

- *"Flat-topped elongated ridges and rounded sandstone hills.*
- *Distinctive steep scarp faces forming stepped, often dark, skyline silhouettes.*
- *Open plateau and gentle dip slopes clothed in heather moorland, acidic grassland mosaic, coniferous forestry and peat bog/mires.*
- *Steeper slopes and craggy outcrops with bracken, heather and broadleaved woodland.*
- *Wet pastures and semi-improved pastures on lower slopes.*
- *Rich muted colours and textures.*
- *Little or no habitation but significant archaeological remains.*
- *Water bodies including natural loughs and reservoirs.*
- *Extensive pasture grazed by sheep and cattle.*
- *Landscape is very open, broken up by small conifer plantations."*

The character of 8c Charlton Ridge LCA are described in further detail:

"A large tract of open upland landscape. Although plateau like, the landform is never flat. It is gently rolling at the north-west and becomes more dramatically undulating towards the south-east where there is an accompanying reduction in landscape scale. Predominant land use is extensive pasture grazed by sheep and cattle. Enclosure is infrequent and often consists only of wire fences. Consequently, the landscape is very open, broken up only by numerous, relatively small and generally rectilinear conifer plantations. The area is crossed by a small number of single track roads and footpaths."

The key characteristics of Lowland Rolling Farmland LCT are given as:

- *"Undulating agricultural landscape with rich soils under predominantly arable cultivation.*
- *Generally little tree cover, with occasional small-scale woodlands and plantations.*
- *Medium-scale parliamentary enclosure landscape.*
- *Field enclosure by hedgerows, with frequent hedgerow trees, has become fragmented in many places.*
- *Trunk roads and prominent road alignments exert a strong influence.*
- *Locally important estate influences, with woodland, and estate villages."*

The character of 38a Longframlington are described in further detail:

"This character area occupies undulating, relatively high ground bordering the coastal plain between the Aln and Coquet valleys. Rectilinear field units are bounded by hedgerows originating from the parliamentary enclosures. Sizeable coniferous plantations can be found around Swarland and north of Shilbottle. Although

the last colliery closed in the late 1990s, coal mining was formerly a significant presence in this landscape, with collieries at Shilbottle, Whittle and Longframlington. Although full restoration is yet to have been completed, there is little physical evidence of this industry now. Other former industrial activity included lime and tile manufacturing."

Local Landscape Character Areas

The Scheme partly lies within LCA 6 – North East Farmed Coastal Plain and LCA 11 – Charlton Ridge.

LCA 6 – North East Farmed Coastal Plain is described as:

"This is an intensively farmed landscape of predominantly open, mixed arable land with limited tree and woodland cover. Farms are typically large with a rectilinear enclosure pattern defined by gappy, close cropped hedgerows with wire fences. Grey sandstone walls provide local variation. A more wooded and intimate enclosed landscape is experienced locally around Embleton and the Howick estate. The A1 and the east coast mainline railway run through this character area, roughly parallel to the coast although these are not prominent due to screening landform and vegetation. Topography slopes gradually from west to east and the area enjoys views to both the sea and the fell sandstone uplands. Occasional but distinctive mature shelterbelts of beech or pine are important local features in this open landscape. The settlement pattern consists of mainly dispersed farmsteads and small nucleated settlements such as Longhoughton, Embelton, North Charlton and Rennington."

The key characteristics of LCA6 – North East Farmed Coastal Plain are given as:

- *"Open, gently undulating mixed arable farmland with occasional small woodlands and shelterbelts;*
- *Dispersed farmsteads and compact villages; and*
- *Relatively large fields with weak enclosure."*

LCA 11 – Charlton Ridge is described as:

"A large tract of open upland landscape. Although plateau like, the landform is never flat. It is gently rolling at the north-west and becomes more dramatically undulating towards the south east where there is an accompanying reduction in landscape scale. Predominant land use is extensive pasture grazed by sheep and cattle. Enclosure is infrequent and often consists only of wire fences. Consequently, the landscape is very open, broken up only by numerous, relatively small and generally rectilinear conifer plantations. The area is crossed by a small number of single track roads and footpaths. The influence of woodland near Alnwick gives an increasing sense of enclosure. Settlement within this landscape is limited to scattered farmsteads. There are long distance views across to the Cheviot Hills in the west."

They key characteristics of LCA 11 – Charlton Ridge are given as:

- *"Open large-scale upland sandstone ridge, which becomes more complex and smaller scale undulating landform in the south east;*
- *Moorland and rough pasture with little enclosure; and*
- *Simple composition fragmented by blocky coniferous plantations."*

The following landscape character area is also present within the 5 km study area:

LCA 7 – Low Aln Valley

This LCA is not anticipated to be affected and is therefore not described in detail here.

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