A1 in Northumberland: Morpeth to Ellingham

Scheme Number: TR010041

6.1 Environmental Statement – Chapter 3 Assessment of Alternatives

APFP Regulation 5(2)(a)

Planning Act 2008

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

June 2020

Infrastructure Planning

Planning Act 2008

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

The A1 in Northumberland: Morpeth to Ellingham

Development Consent Order 20[xx]

Environmental Statement

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

Version	Date	Status of Version
Rev 0	June 2020	Application Issue

CONTENTS

TABLES

FIGURES

3 ASSESSMENT OF ALTERNATIVES

3.1 INTRODUCTION

3.1.1. The Environmental Impact Assessment (EIA) Regulations (as defined in **Chapter 1: Introduction** of this Environmental Statement (ES)) require a description of the reasonable alternatives that have been studied, which are relevant to the Scheme and its special characteristics, providing an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

3.1.2. As Part A: Morpeth to Felton (Part A) and Part B: Alnwick to Ellingham (Part B) are separated by approximately 15 km of existing dual carriageway, the description of the reasonable alternatives contained within this chapter is divided into separate descriptions for Part A and Part B. This is also consistent with the history of the Scheme which was originally being progressed through two separate applications for Development Consent Orders (DCOs), which have now been combined into a single application for a DCO in respect of the Scheme as a whole.

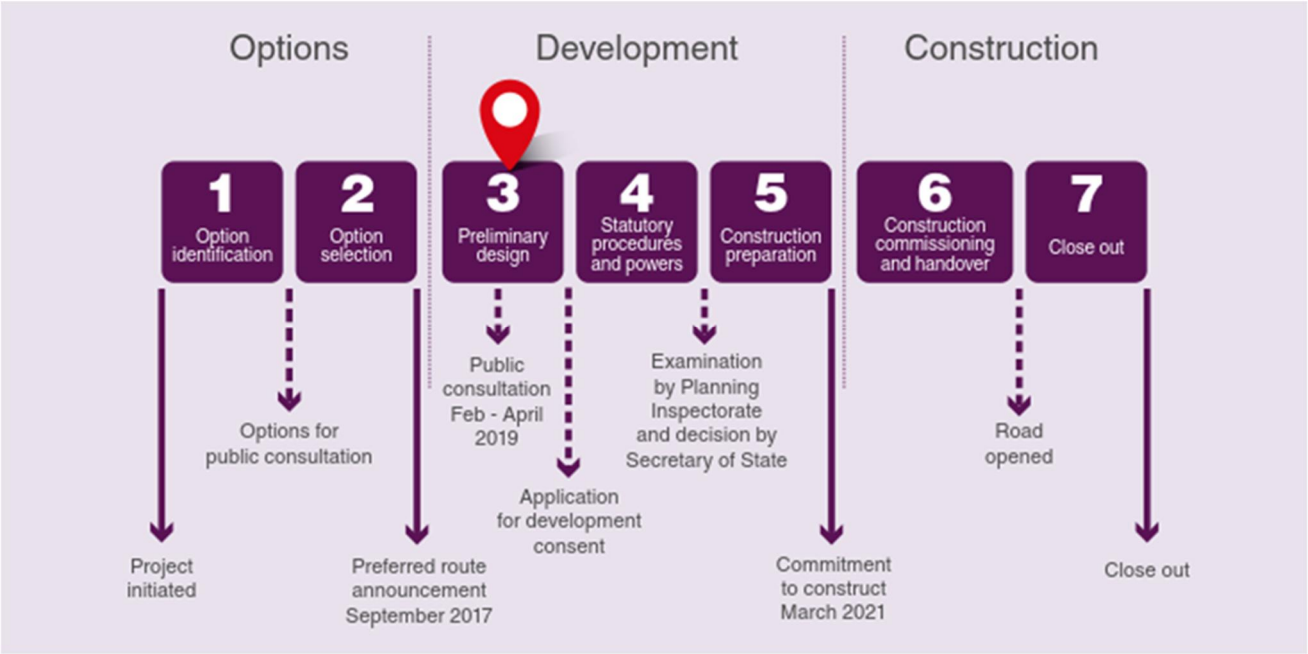
3.2 ASSESSMENT METHODOLOGY

3.2.1. All major road schemes are progressed through the Applicant's major project lifecycle steps as follows:

a. Strategy, Shaping & Prioritisation.
b. Option Identification.
c. Option Selection.
d. Preliminary Design (the current Stage).

3.2.2. The stages are split into three phases: options, development and construction, which are further broken down into stages (refer below to 'in text' **Figure 3-1** – The Applicant's Major Projects Lifecycle). Each stage is aligned to specific milestones to reflect the significant decision points in a scheme's development and delivery. The Scheme is currently at Preliminary Design stage.

Figure 3-1 – The Applicant's Major Projects Lifecycle



3.2.3. Each stage is subject to a Stage Gate Assessment Review (SGAR) prior to commencing to the next stage. SGARs provides assurance that the current stage of a scheme is complete, and the work done is robust.

3.2.4. The major project lifecycle steps (as described in **paragraphs 3.2.1** and **3.2.2** above) have been followed for this Scheme.

3.3 REASONABLE ALTERNATIVES STUDIED

STRATEGY, SHAPING AND PRIORITISATION

2002 to 2005

3.3.1. The A1 Multi-Modal Study (A1MMS) announced by the Secretary of State in December 2002 (**Ref. 3.1**) appraised four scenarios to improve the A1 corridor between Newcastle and the Scottish border, as follows:

a. **Scenario 1** - Making the best use of existing transport system
b. **Scenario 2** - Development of public transport system
c. **Scenario 3** - Selective improvements to highway Infrastructure
d. **Scenario 4** - Major Improvements to highway infrastructure

3.3.2. Scenario 3 included localised improvements between Morpeth and Felton (the section of the A1 covered by Part A) in order to improve both operations on the trunk road and its accident record. The strategy specifically recommended the dualling of 13 km of existing single carriageway between Morpeth and Felton, via a predominantly offline route.

3.3.3. Scenario 3 also included localised improvements between Alnwick and Berwick (the section of the A1 covered by Part B) in order to improve both operations on the trunk road and its accident record. The dualling strategy specifically considered dualling from Charlton Mires to the south end of the existing short section of dual carriageway at North Charlton.

Part A

3.3.4. Following the A1MMS five route options were identified for Part A:

a. **Green route:** This route followed the existing A1 from the termination of the existing dual carriageway at Warrener's House to where it crosses Floodgate Burn. From here, the route left the existing A1 and headed in a north-westerly direction crossing the River Lyne, Fenrother Burn and Fenrother Road. It then continued in a generally northerly direction, between the properties of Tindale Hill and New Houses Farm before passing to the west of Causey Park Bridge. The route then continued in a north-westerly direction, crossing Earsdon Burn twice to Causey Park Road. The route consisted of two crossings over Longdike Burn, and a crossing at Bockenfield Bridge where the route would then follow the existing A1.
b. **Blue route:** This route consisted predominantly of parallel widening of the existing A1, together with general geometrical alignment improvements. The route followed the existing A1 from the termination of the existing dual carriageway at Warrener's House to where the route crossed Floodgate Burn. From here, the route left the existing A1 and headed in a north-easterly direction to Fenrother Junction, crossing the River Lyne and Fenrother Burn. The route continued in a north-easterly direction and crossed the existing A1, and then passed to the east of Earsdon Cottage and crossed Earsdon Road before running parallel to the existing A1 for 1.1 km. The route continued in this direction and crossed Earsdon Burn, and then turned in a north-westerly direction towards Causey Park Lodge and again crossed the existing A1. From here it ran in close proximity to the existing A1 in a northwesterly direction for approximately 800 m before it began to deviate further from the existing A1 at Helm. The route stayed to the east of Longdike Burn as it continued towards its tie-in point with the existing A1 at Bockenfield Bridge.
c. **The 2002 A1MMS route:** This route, as described in the 2002 A1MMS (**Ref. 3.1**), comprised the upgrading of the A1 to dual carriageway standard between Morpeth and Felton via a predominantly offline route (located approximately 2 km to the west of the existing A1 at its furthest point). All local side roads would have been separated from the A1 through bridges and grade separated junctions. The route ran roughly parallel and to the west of the existing A1 for approximately 9.4 km before joining the existing A1 south of the River Coquet at the junction to Bywell. The existing A1 along the southern section would have been de-trunked and used as a local access road to Bockenfield, whilst the remaining 3 km of the route would be widened online. The route would have terminated at the B6345 overbridge east of Felton where the existing A1 would have changed from single to dual carriageway standard. This route would not have avoided the River Coquet and Coquet Valley Woodlands Site of Special Scientific Interest (SSSI), Coquet River Felton Park Local Wildlife Site (LWS) or the Dukes Bank Wood (ancient woodland).
d. **Red route:** This route generally followed a similar route alignment to the 2002 A1MMS route. However, the junction layouts and certain sections of the horizontal and vertical alignment would have been altered.
e. **Brown route:** This route comprised a predominantly online improvement of the existing A1 that involved parallel widening of the existing A1, together with general geometrical

alignment improvements. This route involved the demolition of three residential properties and a number of outbuildings.

3.3.5. The 2002 A1MMS route, the Red route and the Brown route were not taken forward as they did not perform as well as the Blue and Green route options in terms of engineering layout, cost, environmental impact and economic return. These are illustrated on **Figure 3-2** and **Figure 3-3** below.

Figure 3-2 – Red and Brown Route Options

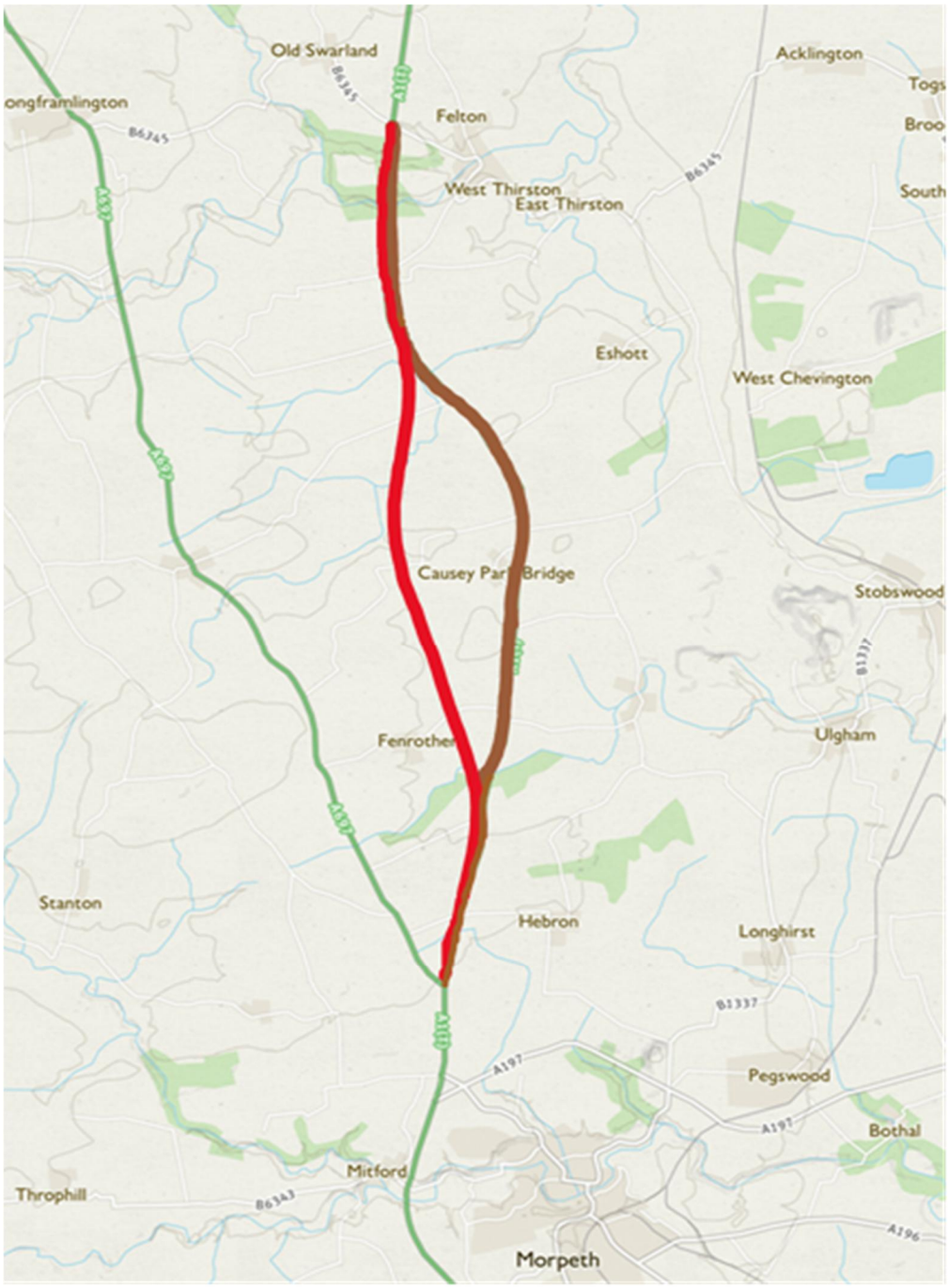
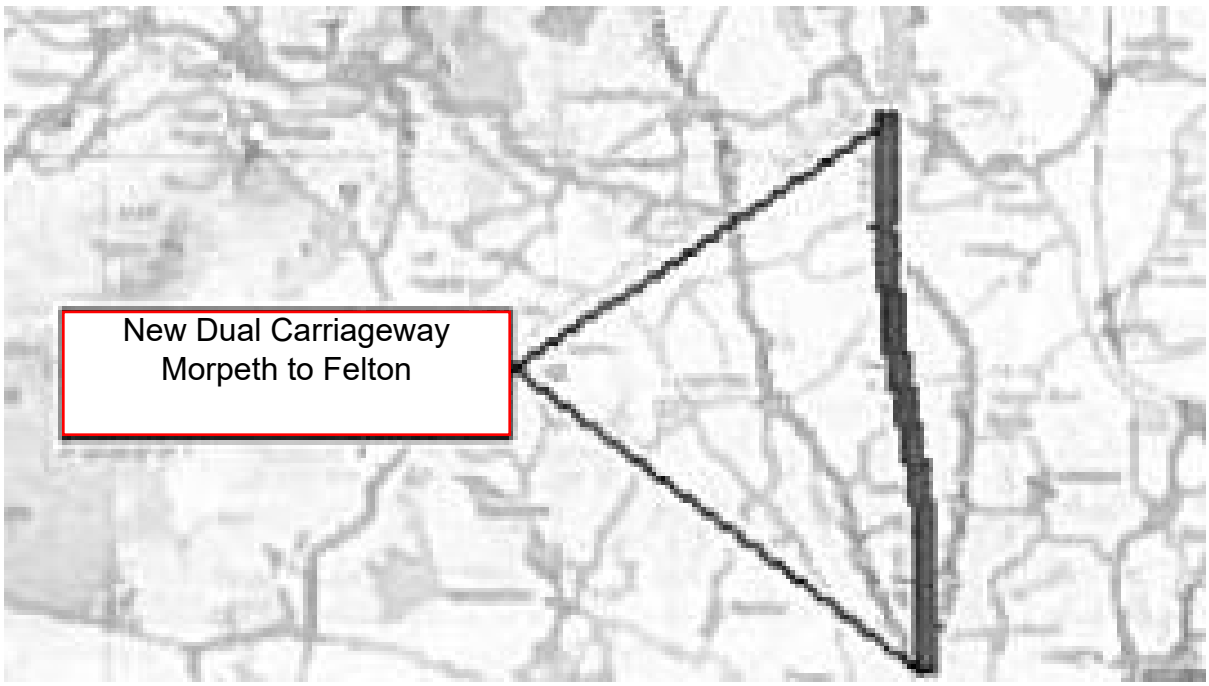


Figure 3-3 – A1MMS Route Option



3.3.6. The Red route (and the A1MMS route) was not taken forward for the following reasons:

a. Higher proportion of new offline construction, with associated environmental impacts.
b. Increased construction cost.
c. Reduced economic benefits compared with other options.

3.3.7. The Brown route was not taken forward for the following reasons:

a. Substantial disruption to traffic during construction.
b. Poor economic benefits, mainly due to disruption to traffic during construction.
c. Difficulty in achieving minimum standards for road alignment.
d. Requirement for demolition of properties.

3.3.8. It should be noted that potential route corridors that would avoid the River Coquet and River Coquet and Coquet Valley Woodlands SSSI, Coquet River Felton Park LWS and the Dukes Bank Wood (ancient woodland) were considered. However, all alternative routes would not avoid crossing the SSSI and would therefore still require an entirely new bridge to be constructed. Furthermore, other options to avoid the Coquet River Felton Park LWS and Dukes Bank Wood (ancient woodland) would have required significant length of additional dual carriageway (between 4 to 5 miles). As a result, no alignments to this effect were considered in the initial option selection for sifting.

3.3.9. Public Consultation (**Ref. 3.2**) on two options (Green route and Blue route) for Part A started in September 2004, comprising exhibitions and written responses. 96% of people indicated their support for upgrading the road to dual carriageway with 65% expressing a preference for the Green route and 24% with a preference for the Blue route.

3.3.10. In March 2005, a preferred route was announced for the A1 Morpeth to Felton Green route. However, this route was not progressed at that point as funding could not be secured.

3.3.11. The decision to proceed with the Green route was a result of:

a. Public preference from consultation.
b. Regional and Local Government bodies supported the proposed dualling and expressed a preference for the Green route.
c. The Green route represents the best value for money and would be generally environmentally preferable. Furthermore, the Green route would generate less disruption to traffic during construction.

Part B

3.3.12. Following the appraisal against environment, safety, economic, integration and accessibility criteria, and modelling of the scenarios, the A1MMS recommended that dualling of the carriageway north of Alnwick would support a reduction in accidents and provide safe overtaking opportunities along the sections of single carriageway. Further dualling of single carriageway sections of the A1 between Newcastle and the Scottish border were also recommended to improve access to the transport system and realise wider economic benefits.

3.3.13. The improvements identified in the A1MMS were not further pursued at the time as the Applicant prioritised delivery of improvements to the section of the A1 between Morpeth and Felton (Part A).

2011

3.3.14. The A1 North of Newcastle Study published in 2011 (**Ref. 3.3**), considered the evidence that could support options to tackle transport challenges on the A1 corridor between Morpeth and the Scottish border.

3.3.15. The Study highlights that the mixture of highways standards affects the operation of the A1, which includes both Part A and Part B. An analysis of journey times indicated that the route generally had good journey time reliability, but that delays of up to 39 seconds were found at some points on the network and that the route had an above average number of HGVs, which was also found to limit overtaking opportunities along the route.

3.3.16. The Study suggested that a combination of forecast traffic growth, future land use and car ownership trends would mean that traffic volumes along the stretch would continue to increase in the future, which would have the effect of putting more pressure on the network and increasing the number of train passengers.

3.3.17. Stakeholder groups in the area also voiced concerns about the A1 North of Newcastle corridor, namely:

a. Concerns about the lack of overtaking opportunities.
b. The belief that there is an opportunity to improve regional connectivity and to deliver regeneration opportunities in the North East by improving the A1.

c. The belief that the A1 does not adequately cater for the region's needs and is a barrier to employment and investment in the North East of England.
d. That any improvement to the A1 would need to maintain access to Northumberland's key tourist sites whilst maintaining local environmental qualities.

2013

3.3.18. Following the 2013 Spending Review (**Ref. 3.4**), the Government announced its plans to invest in the Strategic Road Network (SRN). Investing in Britain's Future was published in July 2013 and sets out details of the programme of infrastructure investment. As part of that investment programme, the Government announced a number of feasibility studies to examine problems on the SRN and to identify potential solutions. This included a study of the A1 North of Newcastle.

2015

3.3.19. An A1 North of Newcastle Feasibility Study was carried out in February 2015 (**Ref. 3.5**) which considered the full route of the A1 in Northumberland between its junction with the A19 at Seaton Burn and the Scottish Border. The study commenced in 2013 and was commissioned by the Highways Agency (whose responsibilities have now been assumed by Highways England) to determine the viability of potential improvements. It also included engineering and economic aspects and the identification of environmental constraints. Refer to **Section 2.2** of the **Case for the Scheme** (**Application Document Reference: TR010041/APP/7.1**) for further information on the 2015 A1 North of Newcastle Feasibility Study.

3.3.20. This Study led to the definition of a scope of work for improvement to the A1 in Northumberland as announced in the Department for Transport's (DfT's) Roads Investment Strategy: 2015 to 2020 (RIS) in December 2014 (**Ref. 3.6**), which was progressed to the Options Identification Stage.

3.3.21. A preliminary economic assessment was also progressed as part of this stage, as detailed in the A1 North of Newcastle Feasibility Study (**Ref. 3.5**), to refine the options. A summary of the A1 North of Newcastle Feasibility Study is available on the government's website: https://www.gov.uk/government/publications/a1-north-of-newcastle-feasibility-study-overview.

OPTION IDENTIFICATION

3.3.22. It should be noted that in identifying options, no option combining Part A and Part B has been identified for the Scheme. This is because dual carriageway is already in place between Part A and Part B. Hence, it would be disproportionate to have proposed an entirely new alignment offline of the existing dual carriageways purely to ensure a contiguous Scheme.

Part A

3.3.23. The scope of work for the improvement to Part A was refined and three route options identified, considering the environmental constraints previously identified in the A1 North of

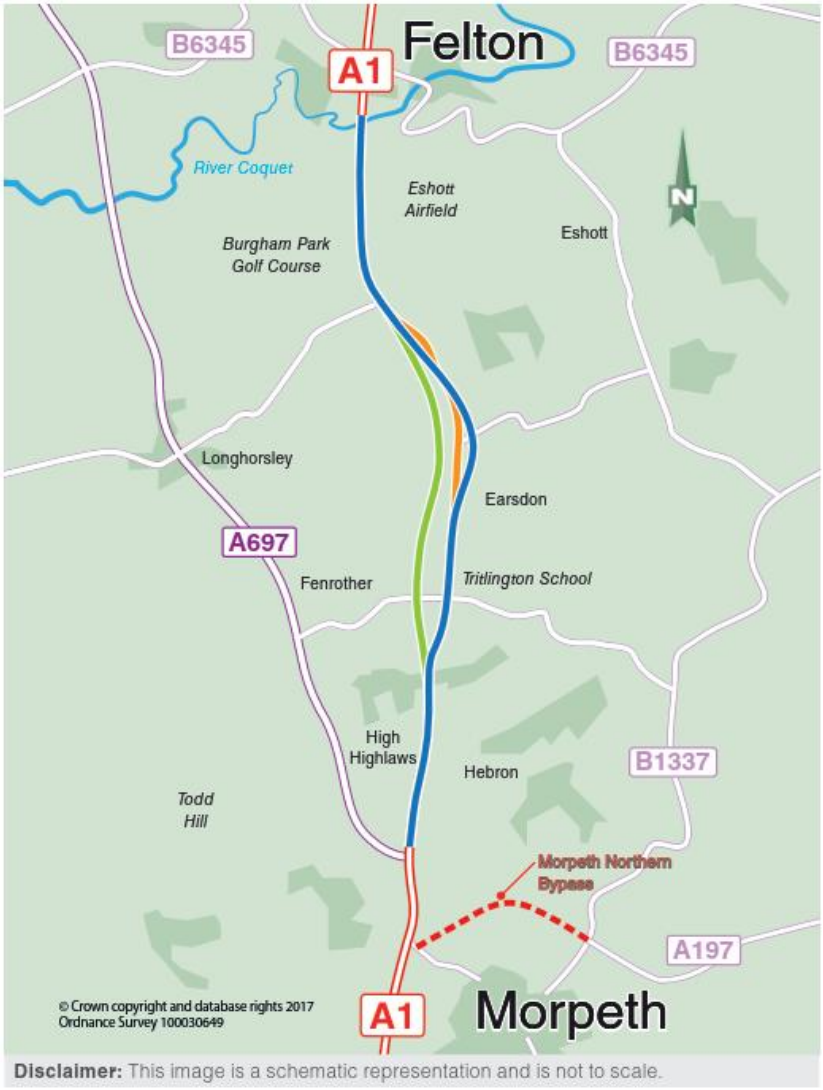
Newcastle Feasibility Study (**Ref. 3.5**). The Green and Blue Options comprised the same route alignment as the green and blue routes identified in the Strategy, Shaping and Prioritisation stage (refer to **paragraph 3.3.4)**, and a new Orange Option was introduced.

3.3.24. Early stage designs were developed and potential locations for junction improvements were identified and assessed.

3.3.25. These options for Part A, which all include upgrading the existing A1 to dual carriageway, new grade separated junctions, and a new bridge over the River Coquet, are described below and are illustrated in **Figure 3-4:**

a. **Orange** (**online**) **–** Online widening of the existing A1, four new grade separated junctions at Highlaws, Fenrother, Earsdon and West Moor and construction of a new bridge over the River Coquet parallel to the existing bridge.
b. **Blue** (**hybrid**) **–** Widening the existing A1, as with the 'orange' option, except for two bypass sections of new dual carriageway; one section to the east of the existing A1 near Causey Park Bridge and one to the west of the existing A1 between Helm and Felmoor Park. Four new grade separated junctions at Highlaws, Fenrother, Earsdon and West Moor and construction of a new bridge over the River Coquet parallel to the existing bridge.
c. **Green** (**offline**) **–** As with the 'orange' option, the A1 would be widened on the existing alignment to Priest's Bridge. From here, the new A1 would move west of the current road and pass west of Tindale Hill and Causey Park Bridge. Just north of Burgham Park, it would re-join the existing A1 and widening would continue along the existing road northwards until it meets the existing dual carriageway north of Felton. Three grade separated junctions proposed at Highlaws, Fenrother and West Moor and a new bridge over the River Coquet parallel to the existing bridge.

Figure 3-4 – Options Considered During the Option Selection Stage (Part A)



3.3.26. 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 for Part A.

Part B

3.3.27. The scope of work for the improvement to Part B was refined and three route options identified, taking into account the environmental constraints previously identified in the A1 North of Newcastle Feasibility Study (**Ref. 3.5**).

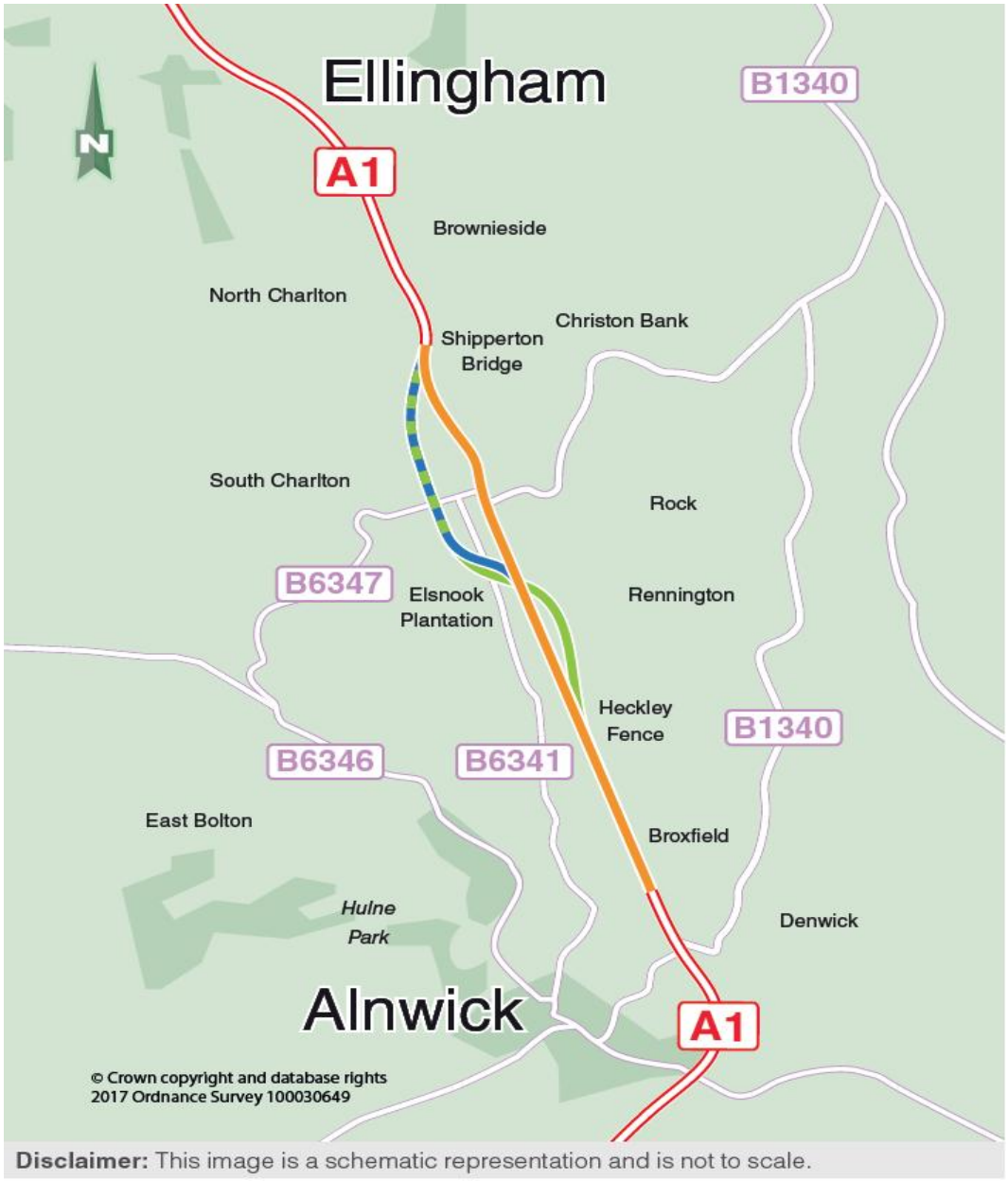
3.3.28. Early stage designs were developed and potential locations for junction improvements were identified and assessed.

3.3.29. The three options are described below and are illustrated in **Figure 3-5** below:

a. **Orange Option**: Upgrade the existing A1 to dual carriageway, widening either to the east or the west depending on the local features that needed to be considered.

b. **Green Option**: Upgrade approximately 1.2 miles (2 km) of existing A1 to dual carriageway and build a new carriageway to the east of the existing A1 at Heckley Fence, before crossing over to the west of the existing road at Elsnook Plantation and continuing until Shipperton Burn.
c. **Blue Option**: Upgrade the majority of the existing A1 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.

Figure 3-5 – Options Considered uring the Option Selection Stage (Part B)



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

OPTION SELECTION

Part A

3.3.31. In September 2016, the Option Selection stage commenced to further consider the three options taken forward.

3.3.32. The three options were assessed at Options Selection (as documented in the A1 in Northumberland Environmental Assessment Report (EAR), 2017 (**Ref. 3.7**)). The assessments reported in this Environmental Assessment Report were considered against the Scheme Objectives (refer to **Section 2.2** of **Chapter 2: The Scheme** of this ES which sets out the Scheme Objectives) to determine whether, relevant to each technical component, Part A would achieve them or not.

3.3.33. **Table 3-1** below presents a summary of the options assessment, with the key environmental differences between the options. Where impacts are similar or the same between the options, they are not referred to in all cases.

Table 3-1 – Summary of Options Assessment (Part A)

Environmental Topic	Orange Option	Blue Option	Green Option
Air Quality	No significant impacts on local air quality. However, increase in mass emissions to regional air quality due to an increase in traffic flow.		
Noise and Vibration	Increase in noise in the largest number of properties. Reduction in noise in the smallest number of properties.	Reduction in noise in the largest number of properties in the short-term.	Increase in noise in the smallest number of properties. Reduction in noise in the largest number of properties in the long-term.
Landscape and Visual	Larger numbers of adverse visual effects and fewer beneficial visual effects than the Green Option.		The offline section would have an initial adverse effect on landscape character but would be reduced in the long-term as planting became mature. Offline section would run closer to the Area of High Landscape Value than other options. Adverse and beneficial visual effects.
Cultural Heritage	No impact on Scheduled Monuments. Potential removal of archaeological remains and impacts upon the historic landscape. Removal of two Grade II listed milestones.		No impact on Scheduled Monuments. Potential removal of archaeological remains and impacts upon the historic landscape. The offline section has the potential to impact the potential buried site of Helm Chapel. Higher potential for adverse impact upon more unknown archaeological remains than the other options. Extensive surveys required. Removal of one Grade II listed milestone.
Biodiversity	Adverse effect upon the River Coquet and River Coquet Woodlands SSSI, including Dukes Bank Wood (ancient woodland). Extensive loss of trees and loss or compaction of woodland soils in the ancient woodland. Some loss of habitat including arable, improved grassland, pond habitat and hedgerows, and small-scale alteration to riparian habitats as a result of new or modified water crossings. Potential for effects on protected and notable species. Further surveys required.		

Environmental Topic	Orange Option	Blue Option	Green Option
	Least habitat loss in terms of area and diversity of habitat types. Potentially greater impact upon great crested newt, badgers and bats than the Green Option.	Slightly greater habitat loss than the Orange Option. Potentially greater impact upon great crested newt, badgers and bats than the Green Option.	Greatest habitat loss in terms of area and diversity of habitat types. Potentially greatest impact upon water vole and otter than the Blue and Orange Options.
Road Drainage and the Water Environment	Both options would have less increase in impermeable surface area than the Green Option.		The Green Option would have the greatest increase in impermeable area, which may result in greater dilution of pollutants (improving outcomes for water quality) but requiring more attenuation of flows to prevent increases in flood risk. The offline section would intercept more surface water bodies, creating more surface water flooding issues. However, can be resolved through design.
	Risk of short-term adverse effects on water quality during construction. No adverse effects on water quality during operation. Short-term potential flood risk at three locations during construction. No long-term adverse effects in relation to flood risk, with the exception of one location, at the un-named tributary of Fenrother Burn. However, mitigation is likely to eliminate this risk. Potential effects at Back Burn, where the relocation of an outfall may eliminate an existing flooding problem. Potential impact upon channel geomorphology.		
Geology and Soils	Uncertainty about risk associated with former mining areas, particularly in the area around Causey Park and the approaches to the River Coquet Bridge. Further geotechnical surveys are required.		
	Smaller area of Grade 3 agricultural land required than for the Green Option.		Less potential for disturbance of known contaminated land compared to the other options. Permanent loss of 62 ha of Grade 3 agricultural land. Further investigation required.
People and Communities	For walking, cycling and horse-riding (WCH) users, loss of the footway that runs along some sections of the existing A1. Public Rights of Way (PRoW) diversions required. The provision of grade-separated crossings and the diversion of affected footpaths to these crossings would make crossing safer and easier, although there would be fewer places to cross. At all locations most heavily used by WCHs, the effects of Part A would be significantly beneficial, or at worst neutral.		

Environmental Topic	Orange Option	Blue Option	Green Option
	For vehicle travellers, the segregation of local and agricultural traffic from strategic traffic, and the provision of a modern dual carriageway, would result in reductions in stress, and improvements in safety.		
	-		Additional benefit of providing a 6 km long local access road running north-south along the line of the bypassed section of the existing A1, forming a quieter, safer local connecting route.
Material Resources	No substantial materials and waste impacts. Most bulk materials required are available locally. Moderate volumes of manufactured materials would be required for import to the site, requiring transport and contributing to depletion of finite resources. Limited carbon footprint.		

3.3.34. For some environmental topics, particularly ecology and heritage, the Green Option was identified as being the most adverse option, although this difference may be relatively small. For others, such as noise impacts on residents, the Green Option was considered to be the best option as it also offered potential benefits, such as reduced visual impact and requiring fewer trees to be removed along Coronation Avenue than the other options.

Part B

3.3.35. In September 2016, the Orange Option was identified as the sole viable option to take through to the Option Selection Stage for Part B, because the two other options (Green Option and Blue Option) were materially more expensive and offered much lower value for money.

3.3.36. In addition, according to the Option Identification Environmental Assessment Report (**Ref. 3.8**), the Orange Option would have the least adverse impact on the environment, the Blue Option would have an intermediate effect on the environment, and the Green Option would overall have the greatest adverse impact on the environment. Of the three options, the Orange Option would have the least adverse impact on landscape and visual amenity, cultural heritage, ecology, the water environment as well as geology and soils. However, it was identified that the Orange Option would result in a noise increase for properties in the northern section of Part B. Air Quality and Noise were not assessed for the Green Option or Blue Option. It was identified that the Green Option would have a beneficial effect on people and communities (assessed as population and human health in this ES). This is because as part of the Green Option the existing A1 would be converted into a local access road, which would provide easier access for the community.

3.3.37. The key aspects of the Orange Option that were considered for the Option Selection Stage include:

a. Widening of the existing A1 to the east.
b. Second carriageway constructed alongside the existing A1.
c. One new junction at South Charlton (connecting the A1, B6341 and B6347).
d. Closing existing accesses onto the current A1 except two existing private accesses near South Charlton (which would become left-in, left-out only access).
e. Access from other properties would be via local roads to the new junction.
f. Existing junctions from B6341 and B6347 would be closed and diverted to join the new dual carriageway at the new junction.
g. New local roads and access bridges would provide access for businesses and properties to the new junction.
h. The byway open to all traffic near Broxfield would cross the A1 on a bridge.

CONSULTATION

Part A

3.3.38. A non-statutory public consultation on the options for Part A was held between November and December 2016, where the three options were presented to the public and other stakeholders for comment. Six consultation events were held in Morpeth, Alnwick, Belford

and Berwick-upon-Tweed, at which information about Part A, including environmental information, was presented and expert staff were available to answer questions. Information was also available in written and online form and numerous questions have been addressed in writing subsequent to the events. The consultation was also advertised in the local press.

3.3.39. Following consultation, 220 responses were received from across the area covered by Part A and beyond. 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.

3.3.40. The consultation identified strong support for the upgrading of the A1 to dual carriageway. In relation to Part A, 41% of respondents said that the Green Option was their preferred option, 29% preferred the Blue option, 12% preferred the Orange Option, 14% had no preference and 4% did not respond. The main reasons given for preferring each option were:

a. Green Option – it would have less impact/disruption during construction and leave the current A1 as a local road maintaining the existing access and links between communities.
b. Blue Option – it would have the least impact on wildlife/environment/land take.
c. Orange Option – it would take less agricultural land.

3.3.41. Overall, the Green Option attracted the strongest support from the public as the preferred route. In addition, consultation with the landowners identified that the Green Option was preferred to maintain access to the A1 during construction and to facilitate the east - west flow of local traffic. Refer to the 'A1 in Northumberland Improvements: Report on the Public Consultation' (**Ref. 3.9**) for further details.

Part B

3.3.42. At the non-statutory public consultation discussed in **paragraph 3.3.38** above, between November and December 2016, the Orange Option for Part B was presented to the public and other stakeholders for comment.

3.3.43. Following consultation, 41 responses were received in relation to Part B. Responses were received from a broad range of residents, with most respondents being frequent users of the A1 in Northumberland. As for Part A, nearly all respondents were car drivers and lived in the local area.

3.3.44. The Orange Option was the only option to be presented at the non-statutory public consultation. Nearly half of the respondents (49%) agreed with the Orange Option for Part B, five percent disagreed, and the rest said they neither agreed nor disagreed or did not answer (**Ref. 3.9**).

PRELIMINARY DESIGN

3.3.45. Following Option Selection, in September 2017 the Preferred Route Announcement (**Ref. 3.10**) announced the Green Option as being the preferred option to be progressed to

Preliminary Design (the current stage) for Part A. The reasons for the selection of the Green Option are set out in **Section 3.4** below.

3.3.46. For Part B, the Orange Option was announced as being the preferred option to be progressed to Preliminary Design (the current stage) in September 2017. The Orange Option was selected as the preferred option due to its materially better performance in terms of value for money. Further justification is provided in **Section 3.4** below.

3.4 JUSTIFICATION FOR CHOSEN OPTION

PART A

Route Options

3.4.1. The key reasons for progressing the Green Option to Preliminary Design were as follows, as documented in the 2017 EAR (**Ref. 3.7**):

a. It was the most popular option expressed through public consultation responses.
b. It would offer a greater level of safety due to the alignment, as it would have the greatest compliance with geometric standards and offers a high-quality alignment[1].
c. It presents the greatest construction efficiency and worker safety benefits.
d. It retains the existing A1 as a local road where Part A diverts offline, which offers an alternative route should closures be required, and provides a north-south route for local traffic.
e. It would affect fewer landowners than the Orange and Blue Options, although more agricultural land is affected by this option.

3.4.2. The reasons for discounting the Orange and Blue Options are presented in **Table 3-2** below.

Table 3-2 – Reasons for Discounting the Orange and Blue Options

Option	Reason for Discounting
Orange Option (online)	- New alignment is in close proximity to live traffic increasing safety risks to public and construction workers. - Proximity to existing infrastructure complicates construction. - Anticipated traffic management switches due to the weaving alignment of the new road would impact on journey time during construction. - There could be issues with working adjacent to live traffic. Consequently, more consideration would have to be given to off peak working, night working etc., all of which add safety risks.

[1] Primarily due to the greater length of offline alignment, whereby standards such as TD9/93 Highway Link Design (**Ref. 3.11)** are easier to implement.

Option	Reason for Discounting
	- Potentially the worst effect on landowners as proposals may impact a number of dwellings along the new route. Would also create access problems for some properties when existing accesses are closed. - Highway alignment would require the highest number of deviations from current standards.
Blue Option (hybrid)	- Disruption to a greater number of landowners and properties than the Green option. - Adverse effect on farms by the alignment of the junction at Chevington Moor and makes north-south WCH movements worse. - No provision for north-south WCH journeys. - There could be issues with working adjacent to live traffic. Consequently, more consideration would have to be given to off peak working, night working etc., all of which add safety risks. - Proximity to existing infrastructure complicates construction. - Traffic management switches due to the weaving alignment of the new road would impact on journey time reliability during construction.

Part A Design Options

3.4.3. The development of the design for Part A throughout the Preliminary Design Stage has been informed by:

a. Scheme Objectives.
b. Engineering design, with reference to highway, structure and drainage design standards and requirements, such as requirements for statutory undertaker's diversions.
c. Consideration of the potential environmental effects and opportunities as a result of the Scheme design.
d. Consideration of health and safety requirements for construction workers, which influenced the location of online widening.

3.4.4. The project team have worked to ensure that environmental considerations have informed the design process, on an iterative basis.

3.4.5. The key design options that have been influenced by consideration of the environment are described in **Table 3-3** below. It should be noted that **Table 3-3** only presents the environmental factors that contributed to the preferred option selection of each design aspect and does not detail other considerations such as cost, landowner requirements or engineering factors.

Table 3-3 – Environmental Considerations in the Evolution of the Scheme Design (Part A)

Environmental Topic	Description of Design Aspect and Options Considered	Assessment of the Design Aspects and Options
River Coquet Bridge		
Air Quality Landscape and Visual Biodiversity Road Drainage and the Water Environment	Four options were considered for the proposed River Coquet Bridge: - **Option 1:** Three span composite haunched ladder deck bridge (box beams). - **Option 2:** Three or four span composite multi-girder deck bridge. - **Option 3:** Three span composite trapezoidal box girder bridge. - **Option 4 (preferred option – three span):** This option considered 2 sub-options (three span composite ladder deck bridge or four span (I-beams)).	- **Option 1:** Works associated with this option, including setting up of the crane within the lower valley, could generate greater impacts upon sensitive environmental receptors and would require additional control provisions to mitigation potential impacts. Alternatively, if it is established that the existing bridge would accommodate the lifting equipment and crane, the existing bridge would remain closed during lifting operations and therefore impact upon traffic flow. By using weathering steel, the use of Volatile Organic Compound (VOC) emissions would be avoided. Minimum tree or vegetation removal would be required. As the piers would be aligned with the existing bridge piers, potential impacts to flood conveyance would be less than for Options 2 and 4. - **Option 2:** The Incremental Launching Method (ILM) would generate minimal disturbance to sensitive environmental receptors and would also generate no or limited disruption of traffic flow. By using weathering steel, the use of VOC emissions would be avoided. - **Option 3:** Works associated with this option, including setting up of the crane within the lower valley, could generate greater impacts upon sensitive environmental receptors and would require additional control provisions to mitigation potential impacts. Alternatively, if it is established that the existing bridge would accommodate the lifting equipment and crane, then the existing bridge would remain closed during lifting operations due to the size of the section and internal bracing, and therefore impact upon traffic flow. By using weathering steel, the use of VOC emissions would be avoided. Minimum tree or vegetation removal would be required. As the piers would be aligned with the existing bridge piers, potential impacts to flood conveyance would be less than for Options 2 and 4. - **Option 4 (preferred option – three span):** The ILM would generate minimal disturbance to sensitive environmental receptors and would also generate no or limited disruption of traffic flow. By using weathering steel, the use of VOC emissions would be avoided. The four span sub-option could generate adverse impacts upon sensitive environmental receptors associated with the watercourse due to the proximity of the centre pier which is closer to the riverbed than the piers in the three span sub-option. It was concluded that three span was the preferred sub-option.
River Coquet Bridge Construction		
Biodiversity Road Drainage and the Water Environment Climate Change	Two options were considered for the proposed construction methodology for the River Coquet Bridge based on Option 4 (three span option) above: - **Option 1: T**emporary pier. - **Option 2:** King post cable stay option – preferred option).	- **Option 1 (temporary pier):** This engineering option would comprise the construction and installation technique known as launching, whereby the steelwork for the proposed bridge deck would be delivered and prepared to its complete length to the southside of the valley and then pushed using a hydraulic jacking system out over the valley between each of the intermediate piers. Given the spans involved and the size of the proposed steelwork for the permanent load capacity, the structure would not be able to cross the larger central span, without the need for a temporary intermediate pier which reduces this span during launch. The temporary pier would be installed on the north river bank close to the main body of the River Coquet and would involve the use of a concrete pad foundation onto bedrock. This

Environmental Topic	Description of Design Aspect and Options Considered	Assessment of the Design Aspects and Options
		option would involve work close to the River Coquet itself and would present increased flood risk and adverse impacts on the geomorphology of the river bed. - **Option 2 (king post cable stay option – preferred option):** This engineering option would also comprise the construction and installation technique known as launching, as Option 1, but would use a king post cable stay temporary works arrangement instead of the temporary pier required in Option 1. The king post arrangement would help to keep the launch nose of the steelwork at a suitable height and reduce the forces in the steelwork, thus enabling the span to cross the larger central span without the need for a temporary intermediate pier. This option would not require the additional work within the river channel and would reduce the flood risk to this activity. It would also present a lower impact to the river bed geomorphology.
Detention Basins 15 (DB15) and 15a (DB15a)		
Biodiversity Road Drainage and the Water Environment	Three options were considered for attenuation in this area: - **Option 1:** Two underground tank storage solutions, to reduce the potential for birds to be attracted to the area (within the vicinity of Eshott Airfield) which could increase the risk of bird strike. - **Option 2:** Two permanent ponds. - **Option 3 (preferred option):** Two detention basins that would be kept as dry as possible between use in storms.	- **Option 1:** This approach was discounted due to concerns relating to the water quality of the Longdike Burn, which is currently failing against the objectives of the Water Framework Directive, as there would be no treatment of the surface water runoff into the Burn. - **Option 2:** The results of the Highways Agency (now Highways England) Water Risk Assessment Tool (HAWRAT) assessment indicated that there is no requirement for this type of feature. In addition, such a feature could potentially attract birds. - **Option 3 (preferred option):** This would provide treatment of the surface water runoff. Furthermore, recommended shorter, maintained vegetation would also help to deter birds.
Detention Basin 18 (DB18)		
Landscape and Visual Biodiversity	Two options were considered for the location of DB18, which would be sited to the south of the River Coquet: - **Option 1:** Location of DB18 would be positioned more centrally within the field to the south of the River Coquet. - **Option 2 (the preferred option):** Location of DB18 would be parallel to the earthworks of the main alignment of Part A.	- **Option 1:** It was considered that this would create a new visible feature to users of the surrounding footpaths, could interrupt field boundaries and would also require vegetation loss. - **Option 2 (the preferred option):** It was considered that this location would ensure features would be kept within the context of the highway, would have a lower visual awareness from surrounding footpaths (although would be visible to road users), and would require minimal vegetation loss beyond that required for the highway earthworks.
Paradise Culvert		
Air Quality Biodiversity Road Drainage and the Water Environment	Three options were considered for this culvert: - **Option 1:** Precast concrete arch extension. - **Option 2:** New precast concrete box culvert. - **Option 3 (the preferred option):** New precast concrete pipe.	- **Option 1:** This could risk polluting the watercourse due to in-situ concrete casting, with the watercourse being disrupted for longer periods compared to other options. Furthermore, the extension would not be compliant with environmental standards (HA 81/99, pt.9) (**Ref. 3.12**) and would not accommodate mammal passage. This option would generate a larger carbon footprint due to transportation requirements. - **Option 2:** Construction would be in a controlled environment and would therefore minimise risk to the watercourse (e.g. through spillage) but would require extensive transportation requirements and therefore generate a larger carbon footprint. This would accommodate the provision of a mammal passage.

Environmental Topic	Description of Design Aspect and Options Considered	Assessment of the Design Aspects and Options
Climate Change		- **Option 3 (the preferred option):** Construction would be in a controlled environment and would therefore minimise risk to the watercourse (e.g. through spillage) and would require fewer transportation requirements than Option 2. This would accommodate the provision of a mammal passage.
Priest's Bridge Culvert		
Air Quality Biodiversity Road Drainage and the Water Environment Climate Change	Three options were considered for this culvert: - **Option 1 (the preferred option):** New precast concrete box culvert. - **Option 2:** In-situ concrete standard portal. - **Option 3:** Precast reinforced concrete arched culvert.	- **Option 1 (the preferred option):** Precast units would be constructed in a controlled environment minimising the risk of concrete spillages into the watercourse. However, this could have extensive transport requirements and therefore potentially a large carbon footprint. - **Option 2:** This option would have a risk of concrete spillage into the watercourse. In addition, the watercourse would be disrupted for longer periods than the other options due to the extensive site works required. This option would also have a larger carbon footprint than the other options. - **Option 3:** Precast units would be constructed in a controlled environment minimising the risk of concrete spillages into the watercourse. In addition, the watercourse would be disrupted for a longer period than Option 1, due to site works required for the in-situ foundations. The carbon footprint for this option would be smaller than for Option 2, but larger than Option 1.
Burgham Culvert		
Biodiversity Road Drainage and the Water Environment Material Resources	Three options were considered for this culvert: - **Option 1:** New precast concrete box culvert. - **Option 2:** In situ reinforced concrete saddle. - **Option 3 (the preferred option):** Do minimum approach.	- **Option 1:** Precast units would be constructed in a controlled environment minimising the risk of concrete spillages into the watercourse. - **Option 2:** The watercourse would not be disrupted during construction. As the existing structure would be retained, less waste would be generated. - **Option 3 (the preferred option):** Although the existing headwalls and wingwalls would be modified, without significant works to the existing culvert, there is less potential for environmental impacts than the other options.
Bockenfield Culvert		
Air Quality Biodiversity Road Drainage and the Water Environment Climate Change	Three options were considered for this culvert: - **Option 1 (the preferred option):** New precast concrete arch extension. - **Option 2:** Replacement of existing 1934 masonry arch with precast concrete arch. - **Option 3:** Full reconstruction with a precast concrete box culvert.	- **Option 1 (the preferred option):** Precast units would be constructed in a controlled environment minimising the risk of concrete spillages into the watercourse and transportation requirements. - **Option 2:** Precast units would be constructed in a controlled environment minimising the risk of concrete spillages into the watercourse. However, the use of an in-situ saddle would generate a larger carbon footprint, and the watercourse would be disrupted for longer periods than the other options due to the extensive site works required. - **Option 3:** The demolition of existing structures would generate increased waste production. Precast units would be constructed in a controlled environment minimising the risk of concrete spillages into the watercourse. However, due to the number of units required, transportation requirements would be higher than the other options.

Environmental Topic	Description of Design Aspect and Options Considered	Assessment of the Design Aspects and Options
Material Resources		
Glenshotton Culvert		
Biodiversity Road Drainage and the Water Environment Material Resources	Three options were considered for this culvert: - **Option 1:** Precast concrete box culvert extension. - **Option 2:** Precast portal structure extension. - **Option 3** (**the preferred option**)**:** Precast pipe extension.	- **Option 1:** Precast units would be constructed in a controlled environment minimising the risk of concrete spillages into the watercourse. This option would generate minimal demolition and waste removal. - **Option 2:** Precast units would be constructed in a controlled environment minimising the risk of concrete spillages into the watercourse. However, this option could generate a greater carbon footprint due to the in-situ construction of strip footings, which could also generate risk of pollution to the watercourse. - **Option 3 (the preferred option):** Precast units would be constructed in a controlled environment minimising the risk of concrete spillages into the watercourse. This option would generate minimal demolition and waste removal. The construction site would be less cluttered as standard components would be used which the manufacturer would likely already have in stock, meaning that deliveries could be timed to suit construction, rather than being made to order and likely having to be stored on site.
Parkwood Culvert		
Biodiversity Road Drainage and the Water Environment Material Resources	Three options were considered for this culvert: - **Option 1:** Precast concrete box culvert extension. - **Option 2:** Precast portal structure extension. - **Option 3** (**the preferred option**)**:** Precast pipe extension.	- **Option 1:** Precast units would be constructed in a controlled environment minimising the risk of concrete spillages into the watercourse. This option would generate minimal demolition and waste removal. - **Option 2:** Precast units would be constructed in a controlled environment minimising the risk of concrete spillages into the watercourse. However, this option could generate a greater carbon footprint due to the in-situ construction of strip footings, which could also generate risk of pollution to the watercourse. - **Option 3** (**the preferred option**)**:** Precast units would be constructed in a controlled environment minimising the risk of concrete spillages into the watercourse. This option would generate minimal demolition and waste removal. The construction site would be less cluttered as standard components would be used which the manufacturer would likely already have in stock, meaning that deliveries could be timed to suit construction, rather than being made to order and likely having to be stored on site. However, the watercourse would be disrupted for longer than the other options due to the extensive site works required, associated with the requirements for an in-situ base slab, cover slab and mass concrete surrounding the pipe.
Highlaws Junction, Fenrother Junction, Causey Park Overbridge and West Moor Junction		
Air Quality Biodiversity	Four options were considered for these proposed overbridges: - **Option 1** (**preferred option**)**:** Single span prestressed precast concrete beam deck. - **Option 2:** Single span steel ladder deck composite bridge.	- **Option 1** (**preferred option**)**:** This option would minimise risk to the environment, the production of waste and the production of new construction materials as it would be precast. This option would also generate the lowest carbon footprint compared to Options 2, 3 and 4 as less in-situ concrete construction would be required.

Environmental Topic	Description of Design Aspect and Options Considered	Assessment of the Design Aspects and Options
Climate Change Road Drainage and the Water Environment Material Resources	- **Option 3:** Single span steel multi-girder deck composite bridge. - **Option 4:** Two span continuous prestressed precast concrete beam deck.	- **Option 2:** Due to the protective layer on the weathering steel beam surface, beams would resist atmospheric corrosion to a greater degree compared to other steels and therefore the use of VOC emissions would be avoided. During construction this option would generate a higher carbon footprint compared to Option 1 due to the thicker deck slab at the steel beams. - **Option 3:** Due to the protective layer on the weathering steel beam surface, beams would resist atmospheric corrosion to a greater degree compared to other steels and therefore the use of VOC emissions would be avoided. During construction this option would generate a higher carbon footprint compared to Option 1 due to the thicker deck slab at the steel beams. - **Option 4:** Using precast units would minimise the risk to the environment, the production of waste and production of new construction materials as it would be precast. However, this option would generate a larger carbon footprint compared to Options 1, 2 and 3 as more in situ concrete construction would be required due to the additional support.
Burgham Park Underbridge		
Air Quality Biodiversity Climate Change Road Drainage and the Water Environment Material Resources	Four options were considered for the proposed underbridge: - **Option 1** (**preferred option**)**:** Integral single span bridge with a prestressed precast beam deck. - **Option 2:** Twin leaf precast circular arch - **Option 3:** Single leaf precast flat arch. - **Option 4:** Integral single span bridge with multi-girder steel composite deck.	- **Option 1** (**preferred option**)**:** Precast units would be constructed in a controlled environment minimising the risk to the environment. This option would generate a similar carbon footprint to Options 3 and 4, and a greater footprint than Option 2, due to the cast in-situ abutments. This could also generate a risk of concrete spillage. It is likely that this option would require less maintenance in the long-term. - **Option 2:** Precast units would be constructed in a controlled environment minimising the risk to the environment. The absence of in-situ concrete abutments would result in lower risk of concrete spillage and lower carbon footprint compared to the other options, although in-situ concrete would be used to connect the two arch leaves. Multiple units would require extensive transportation requirements and therefore generate a greater carbon footprint. Furthermore, a more intensive use of cranes is anticipated compared to the other options. - **Option 3:** Arch components can be pre-fabricated off-site thereby minimising potential pollution and reducing waste production. However, the in-situ casting of the concrete foundations and abutments could generate risk of pollution. - **Option 4:** This option would require greater usage of in-situ concrete than Options 2 and 3, although comparable to Option 1, which generates increased risk of environmental pollution. Due to the protective layer on the weathering steel beam surface, beams would resist atmospheric corrosion to a greater degree compared to other steels and therefore the use of VOC emissions would be avoided.
Parkwood Subway		
Air Quality Biodiversity Climate Change	Two options were considered for the proposed subway: - **Option 1:** Precast box extension. - **Option 2** (**the preferred option**)**:** Construction of an independent structure next to the existing one.	- **Option 1:** Extending the structure would minimise the production of waste and new construction materials. However, demolition of the existing wing walls would produce a large amount of waste that would either need to be re-used on site, recycled or sent on to landfill. Precast units would be constructed in a controlled environment minimising the risk of concrete spillages. - **Option 2** (**the preferred option**)**:** This option would generate a larger carbon footprint than option 1 due to the construction of a longer span structure and could also generate risk to the

Environmental Topic	Description of Design Aspect and Options Considered	Assessment of the Design Aspects and Options
Road Drainage and the Water Environment Material Resources		environment with the works being on site for longer. However, this option would generate less demolition waste and road closures would be minimal in comparison to option 1.
Parkwood Subway Drainage Tank (T21)		
Cultural Heritage Biodiversity People and Communities Landscape and Visual	Three options were considered to provide a drainage solution near to Parkwood subway: - **Option 1:** Detention basin to the west of the A1, within an area of woodland. - **Option 2:** Three detention basins to the east of the A1; one to the south of the private access track under the subway and two to the north of the track. - **Option 3** (**the preferred option**)**:** Geocellular buried tank, to the east of the A1 and south of the track.	- **Option 1:** As a detention basin at this location would be within approximately 130 m to the Grade II Listed Longfield Cottage, there would be potential for adverse impacts upon its settings during construction and operation of Part A. It would also be within 500 m of two great crested newt ponds, each supporting low populations. This option would be less visually intrusive. Construction work would be subject to seasonal constraints (newts, nesting birds, red squirrel). It would also result in habitat loss. - **Option 2:** The detention basins would be located within the area of Felton Park Conservation Area, which comprises a group of Grade II* and Grade II buildings. This option would also result in the loss of an inactive outlier badger sett, and red squirrel are present in the woodland. Construction work would be subject to seasonal constraints (nesting birds, badger and red squirrel). Although the option would also result in habitat loss, planting of the detention basin areas as a wet woodland could contribute to addressing wider habitat loss as part of the mitigation strategy. The detention basins would be located on either side of a PRoW and their inclusion within the landscape would be at odds to the existing character of the area and the nature of the view. - **Option 3** (**the preferred option**)**:** The tank would be a 9x25 m tank with a maintenance area off the private access track under the subway access road to allow desilting of the chambers upstream of the tank (refer to **Chapter 2: The Scheme** of this ES for further information). This option would require the least land take and habitat loss and would be below ground and therefore not visible to sensitive receptors and WCHs using PRoW within the vicinity.
Swale (S1)		
Material Resources People and Communities Landscape and Visual Road Drainage and the Water Environment	Two options were considered: - **Option 1:** A detention basin nominally circular/oval in shape. - **Option 2** (**the preferred option**)**:** A detention basin in a linear form more commonly called a swale.	- **Option 1:** This was rejected as the extents of the excavation would be large. - **Option 2** (**the preferred option**)**:** This can be accommodated at this location with reduced land take.

PART B

Route Options

3.4.6. The Orange Option was identified as the sole option to take through to the Option Selection Stage for Part B. The Orange Option is described in **paragraph 3.3.37**. As detailed in **paragraph 3.3.36**, the Orange Option would overall have the least adverse impact on the environment when compared to the Green Option and Blue Options.

Part B Design Options

3.4.7. The Orange Option has been developed and refined through the Preliminary Design Stage by considering different options for certain elements of the design for Part B (e.g. the location of an overbridge to the south of Part B) but keeping the general route alignment of the Orange Option. The development and refinement of the Orange Option has been informed by:

a. Scheme Objectives.
b. Engineering design, with reference to highway, structure and drainage design standards and requirements such as requirements for statutory undertaker's diversions.
c. Consideration of the potential environmental effects and opportunities as a result of the Scheme design.
d. Consideration of health and safety requirements for construction workers, which influenced the location of online widening.

3.4.8. The project team have worked to ensure environmental considerations have informed the design process, on an iterative basis.

3.4.9. The key design options that have been influenced by consideration of the environment are described in **Table 3-4** below. **Figure 3.6: Alternative Options: Part B** of this ES shows the options considered in **Table 3-4** where a specific option, rather than general idea, was considered.

Table 3-4 – Environmental Considerations in the Evolution of the Scheme Design (Part B)

Environmental Topic	Description of Design Aspect and Options Considered	Assessment of the Design Aspects and Options
Location of Online Widening		
Air Quality Noise and Vibration Landscape and Visual Cultural Heritage Biodiversity Road Drainage and the Water Environment Geology and Soils Population and Human Health Material Resources	Two options were considered for the location of the new carriageway in relation to the existing A1: - **Option 1**: Widening to the west of the existing A1. - **Option 2** (**Option Taken Forward**)**:** Widening to the east of the existing A1.	It was initially considered that **Option 1** would be most beneficial because it 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 windfarm is located on the west, the cable runs to the east of the existing carriageway from the southern extent of Part B up to the existing junction adjacent to Charlton Mires where it transfers to the west. Retaining the EHV cable in its current location and building the new carriageway to the west was considered a significant financial saving due to the reduced requirement to divert the cable. However, when constructability was considered, **Option 1** was deemed unviable on health and safety grounds. This is due to the risks associated with constructing new drainage infrastructure immediately adjacent to the EHV. Further to the issues associated with the diversion of the EHV cable, widening to the east (**Option 2**) is preferred for operational performance because it provides a natural continuation of the dual carriageway layout at the southern tie-in, where the existing dual carriageway narrows towards the northbound lanes to become a single carriageway. As part of Part B, the cable would be diverted ahead of the main works and would be located at a safe distance from the proposed drainage infrastructure.
Location of Charlton Mires Junction		
Air Quality Noise and Vibration Landscape and Visual Cultural Heritage Biodiversity Road Drainage and the Water Environment Geology and Soils Population and Human Health Material Resources	Two options were considered for a new junction near Charlton Mires: - **Option 1:** A new grade separated junction at Charlton Mires to the south of the existing Charlton Mires junction. - **Option 2** (**Option Taken Forward**): A new grade separated junction to the north of the existing Charlton Mires junction. - **Option 3:** A new grade separated junction at Charlton Mires with a skew alignment. The overbridge would be located to the north of the B6347 and south of Charlton Mires. - **Option 4:** A new grade separated junction across the A1 south of Rock Lodge.	**Option 1** was originally presented as part of the Orange Option. The overbridge would be located to the south of the existing Charlton Mires junction. However, consultation identified that residents of Charlton Mires Farm have a new residential property to the west of the A1 and north of Rock Nab. Consultation also highlighted an existing paddock was located to the south-east of the existing junction at Charlton Mires. Therefore, **Option 2** was developed which moved the overbridge north to accommodate the new residential property to the south-west of the A1 and save the existing paddock to the south-east of the A1. **Option 2** was presented in the Preferred Route Announcement. **Option 3** was developed following further consultation with residents of Charlton Mires Farm. This option differs to **Option 2** because the overbridge across the A1 would be at a skew to connect the B6341. The overbridge would be located to the north of the B6347 and south of Charlton Mires. This option would require less of the Charlton Mires Farm holding to be lost but would require the road to come close to the property and a loss of about 70% of the garden. **Option 4** was developed in consultation with the Valuation Agency Office. For this option the overbridge would cross the A1 to the south of Rock Lodge. The

Environmental Topic	Description of Design Aspect and Options Considered	Assessment of the Design Aspects and Options
		southbound carriageway access and B6347 to the east would be diverted along the tree line between Rock Midstead and Rock Lodge. **Options 1** and **3** were discounted based on consultation with landowners. For **Option 2**, Charlton Mires Farm and East Cottage as well as the associated outbuildings would need to be demolished. The loss of the properties would affect the residents because they would lose their homes, farm buildings and agricultural land holdings, which would affect the viability of their farm businesses. However, as mentioned above, residents of Charlton Mires Farm would prefer this option over **Option 1** because it would accommodate their new residential property to the south-west of the A1. **Option 2** would have an adverse effect on the environment because East Cottages and the outbuildings associated with Charlton Mires Farm support roosting bats. In addition, the properties have features of heritage value that would be lost if the properties were demolished. **Option 4** could have adverse effects on ecology; however, it was anticipated that these issues could be easily mitigated. **Option 2** was taken forward as part of Part B**. Option 2** was deemed to be in the optimal position based on connectivity with the surrounding local road network and access considerations for the residents, properties, and businesses at East Linkhall and West Linkhall. **Option 4** would require increased diversion routes of 2 km for East Linkhall and 900 m for West Linkhall. A new 800 m length of road between Rock Lodge and Rock Midstead would need to be constructed for **Option 4** to connect the existing B6347 and the proposed junction. In addition, **Option 2** would require less construction and offers better value for money when compared to **Option 4**.
Accommodation Overbridge		
Air Quality Noise and Vibration Landscape and Visual Cultural Heritage Biodiversity Road Drainage and the Water Environment Geology and Soils Population and Human Health	Two options were considered for an accommodation overbridge that crosses the A1, located towards the southern extent of Part B. The accommodation overbridge would provide safe passage for Walkers, Cyclist and Horse-riders (WCHs) as well as agricultural movements across the A1. - **Option 1:** An overbridge for vehicular and WCHs would be provided across the A1 to the west of Broxfield. This option would retain the existing Byway and Unclassified County Road 129/022 and Byway 110/013 and provide a safe crossing that would link the byways. - **Option 2** (**Option Taken Forward**)**:** An overbridge for vehicular and WCHs would be provided across the A1 to the east of Heckley Fence. The existing access track to the west and east of the A1 would divert Byway 129/022 and Byway 110/013, and maintain the existing crossing for agricultural vehicles, near Heckley Fence and would be designated the same status.	A Preliminary Environmental Information Report (PEIR) was prepared to present the preliminary results of the EIA for statutory consultation. A preliminary environmental assessment of the two options was undertaken to inform the PEIR. A preliminary assessment of the likely residual significant effects for each of the environmental topics associated with the two overbridge options was undertaken to inform the PEIR. **Option 1** would have significant adverse effects on visual amenity for five PRoW during construction, and one residential property and three PRoW during operation. It is anticipated that **Option 1** would have a significant adverse effect on Grade II Listed Building Heckley House (NHLE 1042044) during construction and operation. **Option 1** would affect farming operations by severing access to farm fields. For **Option 2**, significant adverse noise and vibration effects were anticipated for Heckley Fence. **Option 2** would also have significant adverse effects on visual amenity for three PRoW during

Environmental Topic	Description of Design Aspect and Options Considered	Assessment of the Design Aspects and Options
		construction, and four residential properties and two PRoW during operation. In addition, **Option 2** would have a significant adverse effect on Grade II Listed Building Dovecote to East of Heckley Fence Farmhouse with Attached Wall (NHLE 1371059) during construction and operation. Members of the public were asked which option they preferred as part of the statutory consultation. Of the 32 consultation questionnaires completed, two people preferred **Option 1**, three people preferred **Option 2**, 23 people were neutral on the bridge location, two people felt the bridge was not needed and two people did not answer the question. The **Consultation Report** (**Application Document Reference: TR010041/APP/5.1**) provides further detail on the consultation undertaken in relation to the Scheme and how consultation comments have been considered as part of the Scheme design. The preliminary environmental assessment provided within the PEIR was taken into consideration when deciding the location of the overbridge. **Option 2** was taken forward as the preferred option because it would better serve the local community by preventing severance of a farm by allowing access to the west of the A1 more easily than **Option 1**. In addition, **Option 2** was deemed to have greater potential for tying into the existing PRoW network. The decision to take **Option 2** forward as the preferred option was informed by consultation with the homeowners of Heckley Fence, who would be most affected by **Option 2**. The landowner and tenants at Heckley Fence had no objections to **Option 2** subject to clarification of several issues.
Detention Basin 27 (DB27), former (DB5) and (DB6)		
Cultural Heritage Road Drainage and the Water Environment Landscape and Visual	Two options were considered for DB27 which at statutory consultation were set out as DB5 and DB6 (refer to **Figure 3.6: Alternative Options: Part B** of this ES), including: - **Option 1:** Two detention basins with one located to the north of Part B (former DB6) and one located north-east of Charlton Mires Junction (former DB5). - **Option 2** (**Option Taken Forward**)**:** Removal of former DB6 from Part B and diversion of flows to former DB5 (now known as DB27), located to the north east of Charlton Mires Junction.	For **Option 1**, a detention basin (former DB6) was located in the same field as a Scheduled Monument which is a prehistoric burial mound of national importance. Although former DB6 was located outside of the Scheduled Monument boundary, the construction of the basin could potentially cause disruption and damage to archaeological remains as there is a risk of such remains extending beyond the Scheduled Monument boundary. In addition, during operation there could be changes in water levels due to the presence of the detention basin which could lead to the decay of the archaeological remains associated with the Scheduled Monument. For **Option 2**, former DB6 would be removed from the field with the Scheduled Monument which would eliminate the potential effects, as described above, on the Scheduled Monument. **Option 2** is the option that has been taken forward in the design because it would eliminate the potential adverse effects on the Scheduled Monument. As flows would be diverted from one catchment to another for **Option 2**, this approach was agreed with NCC as the Lead Local Flood Authority.

Environmental Topic	Description of Design Aspect and Options Considered	Assessment of the Design Aspects and Options
Detention Basins 25 and 26, and Former Detention Basin 4		
Road Drainage and the Water Environment Landscape and Visual	Two options were considered for Detention Basin 25 (DB25) and Detention Basin 26 (DB26): - **Option 1:** One detention basin (former DB4) located in the field to the south east of Charlton Mires. - **Option 2** (**Option Taken Forward**)**:** This option included splitting the detention basin into two detention basins (DB25 and DB26) and locating them to the west of the A1 within Charlton Mires Junction.	The hydraulic model for the tributaries of Kittycarter Burn indicated that the former DB4 (**Option 1**) would be located within the 1 in 100 year event plus 25% climate change allowance fluvial flood risk area. The location of the detention basin within this field would therefore render it unfunctional during a flood event. For **Option 2,** the detention basins would be located outside of the fluvial flood risk area meaning that the detention basin would continue to be functional in flood events. This is particularly important given that a detention basin is likely to be of importance contemporaneously with flood events. **Option 2** is the option that has been taken forward in the design.
Statutory Utilities Maintenance Track – Access to Middlemoor Wind Farm		
Air Quality Noise and Vibration Landscape and Visual Population and Human Health	Two options were considered for the maintenance track for statutory utilities for Middlemoor Wind Farm to the north of Part B: - **Option 1:** The maintenance track would be located to the west of North Charlton Farm and follow the field boundaries south to an existing track. The existing track is located to the west of the A1 at approximately chainage 60,500 and links the A1 to an unnamed track to the west. - **Option 2** (**Option Taken Forward**)**:** The easement would follow the existing track located to the west of the A1 as described above.	**Option 1** would require a maintenance track to be constructed from the west of North Charlton Farm to the existing track. **Option 2** would utilise an existing track located to the west of the A1 which means not a new track to not need to be constructed. Constructing a new track could, for example, damage and disturb ecological habitats and species, adversely affect visual amenity, temporarily generate noise and air quality emissions, and use material resources. **Option 2** is the option that has been taken forward in the design.
Maintenance Track for Detention Basin 22 (DB22)		
Road Drainage and the Water Environment Landscape and Visual Biodiversity	Three options were considered for the maintenance track for DB22 and associated lay-by: - **Option 1:** The maintenance track would be located off a layby to north-west of DB22. - **Option 2:** The maintenance track would be located off the B1340 to the north of Alnwick, where it would follow an existing track past Goldenmoor Farm. The maintenance track would then follow two field boundaries north to DB22. - **Option 3:** This option would consist of relocating the southbound, southern lay-by to between approximately chainages 53,560 and 53,620, and providing a maintenance track to the south of the lay-by to DB22. The lay-by and maintenance track would require removal of additional woodland to the that which is required for the haul road and the temporary statutory working width would be in close proximity to Denwick Burn. - **Option 4** (**Option Taken Forward**)**:** The southbound, southern lay-by would be located between approximately chainages 53,950 and 54,000, to	The layby in **Option 1** would have been located partially within Flood Zones 2 and 3 which meant, due to the sequential test, this layby and access road option had to be discounted. The landowner at Goldenmoor Farm objected to **Option 2** as they did not want maintenance vehicles passing close to their property as it was proposed that the maintenance access would utilise the existing track through the courtyard of their property. On this basis, the Applicant discounted **Option 2** as an option for the Scheme design. Although the **Option 4** track is longer than **Option 3**, it would require less additional vegetation removal as it would utilise the haul road used during construction and the temporary statutory working width is located further from Denwick Burn. It is preferable to have the working width further away from Denwick Burn because it reduces the risk of the watercourse being disturbed or

Environmental Topic	Description of Design Aspect and Options Considered	Assessment of the Design Aspects and Options
	the north of the woodland. The maintenance track for DB22 would utilise the haul road used for the construction of Part B. Therefore, the length of the proposed maintenance access track would be longer than that of Option 2.	polluted during construction and operation. **Option 4** is the option that has been taken forward in the design.

REFERENCES

Ref. 3.1 – Government Office for the North East (2002) A1 Multi-Modal Study (A1MMS) Options Appraisal Report (May 2002).

Ref. 3.2 – A1 Morpeth to Felton Dualling, TPI to Preferred Route Announcement Public Consultation Report, Volume 1: Report, March 2005, 104D108/PWW/21/02/B.

Ref. 3.3 – Highways Agency (2011) A1 North of Newcastle Study

Ref. 3.4 – UK Government (2013) Spending Round 2013. [online] Available at: https://www.gov.uk/government/topical-events/spending-round-2013

Ref. 3.5 – Highways Agency (2015) A1 North of Newcastle Feasibility Study. Stage 1 Report. Jacobs. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/408812/a1-north-newcastle-stage-1.pdf

Ref. 3.6 – Department for Transport. Road Investment Strategy: 2015 – 2020. Available at: https://www.gov.uk/government/collections/road-investment-strategy#policy-documents

Ref. 3.7 – Highways England (2017) A1 in Northumberland Environmental Assessment Report, March 2017, Version 1.0.

Ref. 3.8 – Highways England (2016) A1 in Northumberland Environmental Assessment Report, September 2016, Version 2.1

Ref. 3.9 - Highways England (2017) A1 in Northumberland Improvements. Report on public consultation. Available at: https://highwaysengland.citizenspace.com/he/a1-in-northumberland/results/a1-_consultation-report.pdf

Ref. 3.10 - Highways England (2017) A1 in Northumberland Preferred Route Announcement. September 2017. Available at: https://highwaysengland.citizenspace.com/he/a1-in-northumberland/results/n170030_a1-northumberland_pra---morpeth-to-ellingham_v3_digital.pdf

Ref. 3.11 – Highways Agency (2002) Design Manual for Roads and Bridges. Volume 6, Section 1 Part 1. TD9/93 Highway Link Design.

Ref. 3.12 – Highways Agency (2001) Design Manual for Roads and Bridges. Volume 10, Section 4 Part 4. HA 81/99. Nature Conservation Advice in Relation to Otters.

This document is also available on our website at **www.gov.uk /highways**

If you have any enquiries about this document A1inNorthumberland@highwaysengland.co.uk or call **0300 470 4580***.

*Calls to 03 numbers cost no more than a national rate call to an 01 or 02 number and must count towards any inclusive minutes in the same way as 01 and 02 calls.
These rules apply to calls from any type of line including mobile, BT, other fixed line or payphone. Calls may be recorded or monitored.

Registered office Bridge House, 1 Walnut Tree Close, Guildford GU1 4LZ
Highways England Company Limited registered in England and Wales number 09346363