

**A66 Northern Trans-Pennine Project
TR010062**

**3.1 Environmental Statement
Non-Technical Summary**

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Planning Act 2008

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Procedure) Regulations 2009**

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A66 Northern Trans-Pennine Project
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**3.1 ENVIRONMENTAL STATEMENT
NON-TECHNICAL SUMMARY**

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1 Introduction

- 1.1.1 National Highways proposes to improve the A66 by providing a dual two-lane carriageway between M6 Junction 40 at Penrith and the A1(M) Junction 53 at Scotch Corner (the Project). The Project, comprised of eight individual schemes, will help facilitate national and regional connectivity, improve safety and improve the standards of the whole A66 in order to work towards the transformational growth envisaged by the Northern Powerhouse initiative.
- 1.1.2 The Project is a "Nationally Significant Infrastructure Project" under the Planning Act 2008, which means that permission is required to build and operate the Project. The permission is called a Development Consent Order (DCO). The DCO application will be examined by the Planning Inspectorate which will report its findings to the Secretary of State for Transport to aid decision making.
- 1.1.3 An Environmental Statement (ES) (Document Reference 3.2) has been prepared to accompany the DCO application which sets out: a description of the Project and the reasonable alternatives considered in the development of the design, the environmental setting, the likely significant effects of the Project on local communities and the environment, and the measures proposed to mitigate these effects.
- 1.1.4 This document provides a summary of the ES in non-technical language.

2 Need for the Project

- 2.1.1 The A66 is a key national and regional strategic link for a range of travel movement between the M6 at Penrith and the A1(M) at Scotch Corner. The A66 carries high levels of freight traffic and is an important route for tourism and connectivity for nearby communities. There are no direct rail alternatives for passenger or freight movements along the corridor.
- 2.1.2 While most of the existing road is dual carriageway, there is still approximately 17 miles (30km) of single carriageway in six separate sections along the 50-mile (80km) route. These sections act as bottlenecks for users of the route resulting in congestion and traffic delays, therefore making it unreliable and accident-prone. The route also carries local slow moving agricultural and non-motorised users (NMU) traffic making short journeys which can have an impact on other users, especially on the single carriageway sections. The mix of road standards, together with the lack of available diversionary routes when incidents occur, can affect road safety, reliability, resilience and movement along the route.
- 2.1.3 The A66 forms part of the most direct route between the Tees Valley, north, south and west Yorkshire, the East Midlands, eastern England, north Cumbria, and the central belt of Scotland and Cairnryan (for access to Ireland). The recent improvements to bring the A1(M) carriageway to motorway standards between Leeming Bar and the A66(M) is also expected to increase south-to-north movements along the A66.
- 2.1.4 If the existing A66 route is not improved, it will constrain national and regional connectivity and may threaten the transformational growth envisaged by the Northern Powerhouse initiative and the achievement of the Government levelling up agenda.

2.2 Objectives

2.2.1 The Project has eleven objectives set out under four key themes:

Table 2-1: Project objectives

Theme	Project Objectives
Economic	Regional support to the economic growth objectives of the Northern Powerhouse and Government levelling up agenda.
	Ensure the improvement and long-term development of the strategic road network (SRN) through providing better national connectivity including freight.
	Maintain and improve access for tourism served by the A66.
	Seek to improve access to services and jobs for local road users and the local community.
Transport	Improve road safety during construction, operation and maintenance for all, including road users, NMU, road workers, local businesses and local residents.
	Improve journey time reliability for road users.
	Improve and promote the A66 as a strategic connection for all traffic and users.
	Improve the resilience of the route to the impact of events such as incidents, roadworks and severe weather events.

Theme	Project Objectives
	Seek to improve NMU provision along the route.
Community	Reduce the impact of the route on severance for local communities.
Environment	Minimise adverse impacts on the environment and where possible optimise environmental improvement opportunities.

2.3 The Applicant

- 2.3.1 National Highways is the Applicant and the strategic highways company appointed by the Secretary of State under the Infrastructure Act 2015 being charged with operating, maintaining and improving England's motorways and major A roads, known as the strategic road network.

3 Description of the Project

3.1 Environmental context

- 3.1.1 From Penrith the road corridor passes through gentle valleys characterised by large regular fields and areas of deciduous woodland. The road generally follows a similar route to the River Eamont and the River Eden as far as Appleby-in-Westmorland. Moving east, the elevation then rises rapidly from approximately 170 metres above ordnance datum (AOD) at Brough to a high point of approximately 440 metres AOD as it passes over Bowes Moor, before gradually descending again to an elevation of approximately 150 metres AOD at Scotch Corner.
- 3.1.2 The majority of the surrounding land is agricultural with a number of farms lying adjacent and having direct access onto the A66. Some of this land is classified as being Grade 2 which is defined as 'very good' agricultural land.
- 3.1.3 The highway roughly follows the line of a Roman road and, as a result, is straight in alignment for large sections. There are notable deviations as it passes around key settlements along the route, including Penrith, Temple Sowerby, Kirkby Thore, Appleby-in-Westmorland, Brough, Bowes, Greta Bridge and Scotch Corner.
- 3.1.4 Between Brough and Bowes the route runs through the North Pennines Area of Outstanding Natural Beauty (AONB). The North Pennine Moors Special Protection Area (SPA) and Special Area of Conservation (SAC) are encompassed within the North Pennines AONB. The River Eden SAC and its tributaries, which run adjacent to and underneath the A66, are also a key consideration.
- 3.1.5 There are a number of historic constraints, often related to the presence of the Roman road, along the route. These include conservation areas, Scheduled Monuments and a large number of Grade I, II* and II listed buildings, many of which lie directly adjacent to the A66.

3.2 The Project

Summary description

- 3.2.1 The Project objectives will be achieved by providing a continuous, high quality, two-lane dual carriageway on the A66 road between the M6 at Penrith and the A1(M) at Scotch Corner. The Project will be divided into eight sections (otherwise referred to as schemes) which will be constructed in such a way as to minimise disruption to road users. The schemes are situated across the length of the A66 between Penrith and Scotch Corner. There are six schemes wherein single carriageway sections of road will be upgraded to a dual carriageway and improvements will be made to existing junctions, widening the original carriageway in places, with new underpasses or overbridges to maintain or improve connectivity, and the construction of new sections of road for offline sections where required. The two remaining schemes involve the improvement of existing major junctions and motorway connections.

3.2.2 The eight individual schemes are summarised as follows:

M6 Junction 40 to Kemplay Bank

3.2.3 Improvements will be made to the signalling and layout of M6 Junction 40 and its connection onto the A66. The existing A66 will be widened between M6 Junction 40 and Kemplay Bank roundabout, and an underpass will be constructed beneath the Kemplay Bank roundabout to allow for the free flow of traffic along the A66. Slip roads onto the roundabout will be constructed to maintain connection onto the A6 and A686. Plate 3-1 M6 Junction 40 to Kemplay Bank scheme extent- presents an overview of this scheme.

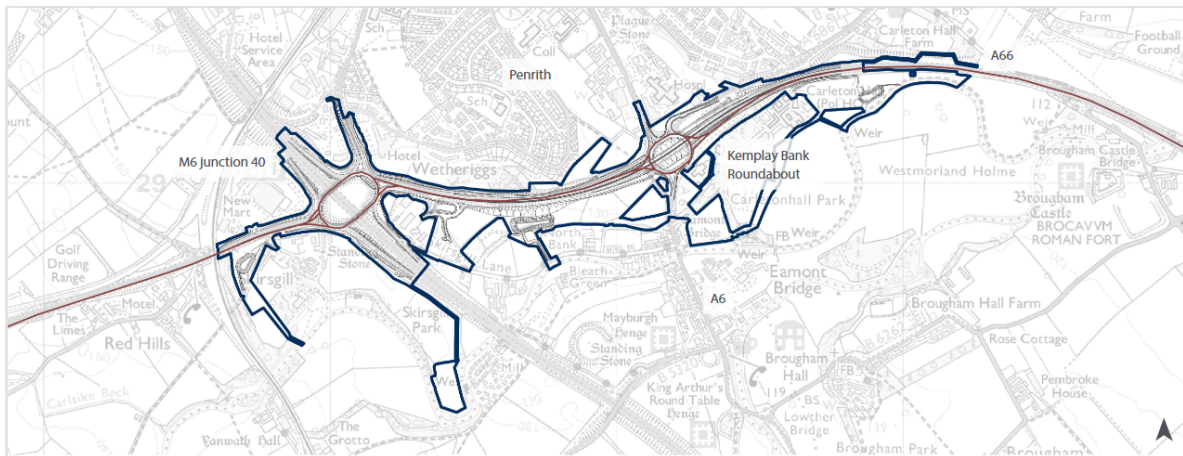


Plate 3-1 M6 Junction 40 to Kemplay Bank scheme extent

Penrith to Temple Sowerby

3.2.4 Upgrade of a section of single carriageway between the River Eden and the Temple Sowerby Bypass to dual carriageway. The existing A66 will be utilised as one carriageway with the other being constructed alongside it. An upgraded, grade-separated junction will replace the existing junction to Center Parcs. Two landowner access crossings will span the A66, an overbridge to the south-west of Whinfell Holme Wastewater Treatment Works, and an underpass to the north-east of Whinfell Park. Improved parking areas will be provided, one at the site of the former Llama Karma Kafé with footpath access to the Countess Pillar, and one at the existing turn off for St Ninian's Church, improving the parking provision and accessibility of this heritage site. Plate 3-2 Penrith to Temple Sowerby scheme extent- presents an overview of this scheme.

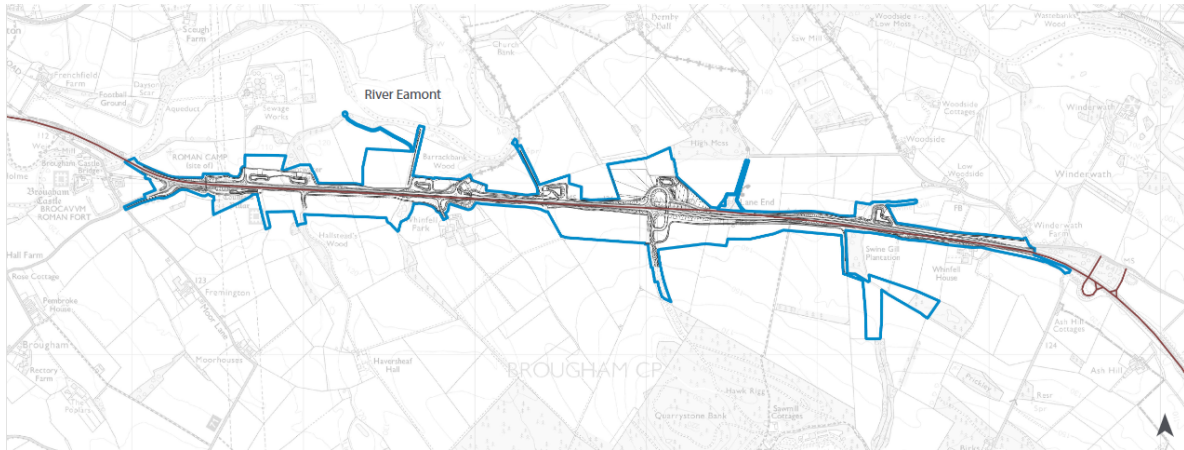


Plate 3-2 Penrith to Temple Sowerby scheme extent

Temple Sowerby to Appleby

- 3.2.5 A new offline section of dual carriageway will be constructed around the north of Kirkby Thore, sweeping around to the south-east to run parallel to the site of the Roman Road north of Crackenthorpe. It will tie back into the Appleby bypass north-west of Appleby, west of the Settle-Carlisle railway bridge. New junctions will be constructed to connect Kirkby Thore and Long Marton onto the new A66, one at Fell Lane to the north of Kirkby Thore to allow HGVs to access the British Gypsum Plant without having to pass through Kirkby Thore proper, and another connecting Long Marton to the new A66 to provide connectivity for the wider settlements in the area.
- 3.2.6 Local roads severed by the new bypass will be put on overpasses over the A66 where possible, such as Fell Lane, Sleastonhow Lane and Cross Street, while others will be diverted to nearby roads to maintain connection, such as Main Street and Priest Lane. An open span viaduct will be utilised to cross Trout Beck to reduce impacts on its floodplain. A small roundabout will be constructed at the western extent of the scheme to provide access onto the de-trunked A66 which will be maintained as a local road with an improved cycleway connection between Appleby and Kirkby Thore. Plate 3-3 Temple Sowerby to Appleby scheme extent-- presents an overview of this scheme.

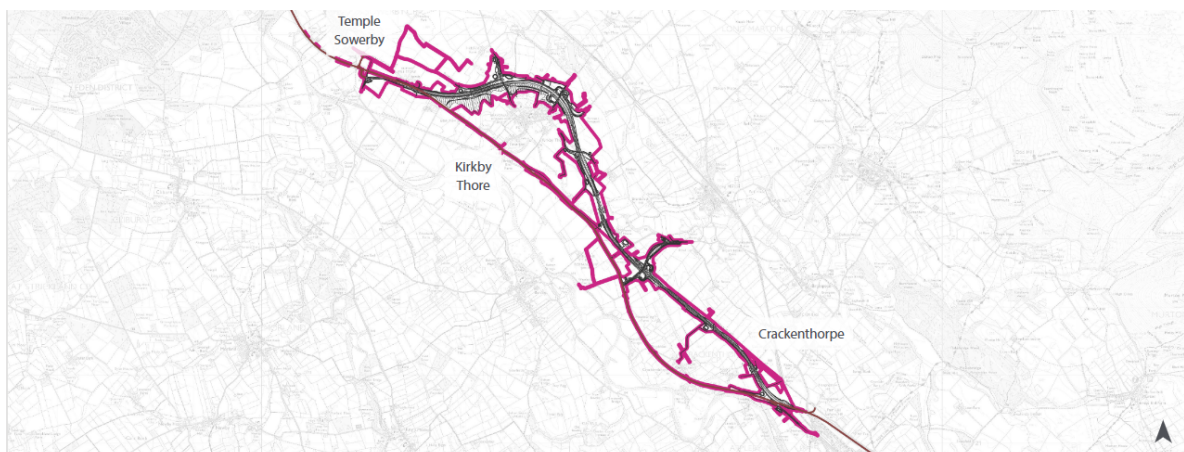


Plate 3-3 Temple Sowerby to Appleby scheme extent

Appleby to Brough

- 3.2.7 A section of single carriageway will be dualled with the existing A66 being used as one of the carriageways in the western extent of the scheme, between Café 66 and Dyke Nook Cottages. From here, a new offline section of dual carriageway will be constructed to the south of the existing A66 until it ties back into the existing A66 to the south-west of Brough where a new junction will provide access into Brough itself. New and upgraded junctions to be provided to improve connectivity and traffic flow to Sandford, Warcop and Flitholme.
- 3.2.8 The existing Ministry of Defence (MOD) tank compound to the north of the existing A66 will be moved to make room for the new Warcop grade-separated junction. It will be relocated further east. The new A66 will cross tributaries of the River Eden, Moor Beck and Cringle Beck on open span structures to reduce impacts on the floodplain connectivity of these watercourses. The existing A66 will be de-trunked and maintained as a local road until its western most point where it will be stopped up. The junction to Café 66 will be made left-in/left-out only, with a local access underpass being provided further east for west-bound traffic. An overbridge for landowner access across the new A66 will be provided in the east of the scheme extent, west of the Brough junction. Plate 3-4 Appleby to Brough scheme extent- presents an overview of this scheme.

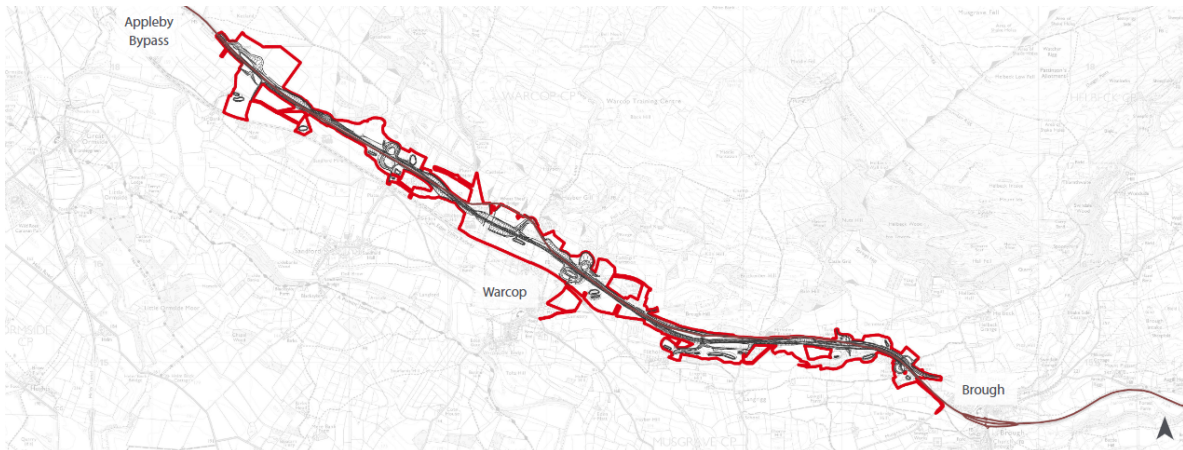


Plate 3-4 Appleby to Brough scheme extent

Bowes Bypass

- 3.2.9 The existing carriageway will be upgraded with a new adjacent eastbound carriageway constructed to the north to create a dualled section. The existing carriageway will carry westbound traffic. Clint Lane overbridge will be reconstructed to accommodate the upgraded (wider) A66 dual carriageway. The junction with the A67 will be upgraded to make way for the new eastbound carriageway. Accommodation accesses will be provided to ensure continued access to the A66 by local residents safely. Access to and from Hulands Quarry will be made safer by closure of the existing central reserve gaps and upgrading the junction geometry. Plate 3-5 Bows Bypass scheme extent-- presents an overview of this scheme.



Plate 3-5 Bows Bypass scheme extent

Cross Lanes to Rokeby

- 3.2.10 The Cross Lanes to Rokeby scheme will mostly follow the existing A66 alignment, with a new adjacent westbound carriageway constructed to the south between the B6277 at Cross Lanes and the existing Tutta Beck Cottage access. Both carriageways will then be routed to the south of the Old Rectory and St Mary's Church, re-joining the existing A66 at Rokeby. A new junction will be constructed at Cross Lanes, west of the Organic Farm Shop and Café; an overbridge will carry a new single carriageway link between the B6277 Moorhouse Lane (to the north) and Rutherford Lane (to the south).
- 3.2.11 Tutta Beck will be realigned through the Cross Lanes Junction. The realignment of Tutta Beck has been minimised through design at this location to reduce effects upon the watercourse. A new junction will be constructed west of the Old Rectory allowing westbound traffic to leave and join the A66, and eastbound traffic to leave the A66. The Rokeby Junction will be constructed in an underbridge to reduce landscape and visual impact upon Rokeby Park Registered Park and Gardens (RPG) and the Grade II* listed Church of St Mary. Plate 3-6 Cross Lanes to Rokeby scheme extent-- presents an overview of this scheme.

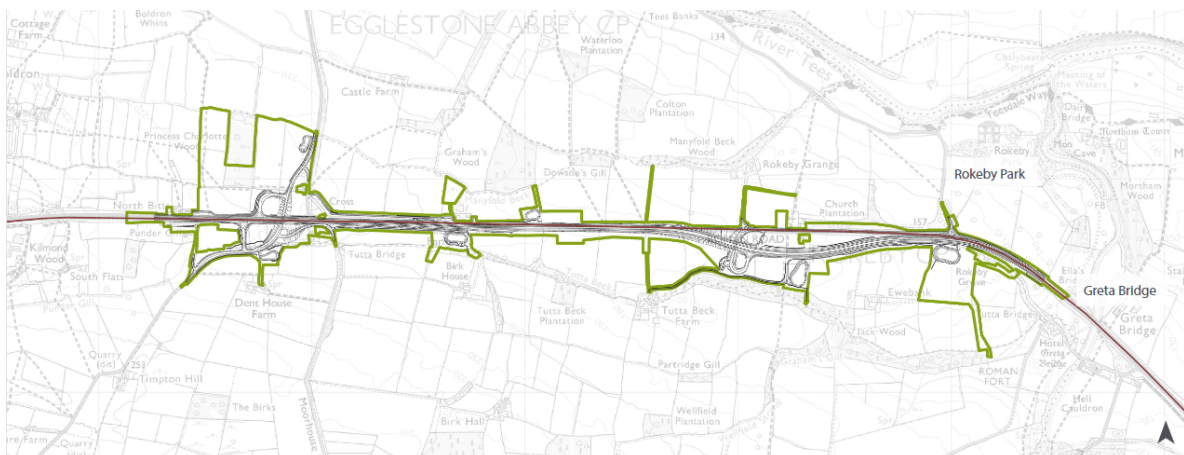


Plate 3-6 Cross Lanes to Rokeby scheme extent

Stephen Bank to Carkin Moor

- 3.2.12 The Stephen Bank to Carkin Moor scheme will comprise a new offline dual carriageway section between Stephen Bank and Carkin Moor Farm. The new dual carriageway will pass to the north of the existing A66 and the properties at Fox Hall and Mainsgill Farm, re-joining the existing A66 alignment after Mainsgill Farm. A new accommodation underpass will be provided to the north of Dick Scott Lane to allow access to land to the north of the new A66 alignment.
- 3.2.13 The existing A66 will be de-trunked and will be used as a collector road for local access to surrounding villages and properties. The proposed alignment of the A66 in this location has been designed to be in a cutting to minimise landscape and visual impacts upon the village of West Layton. The proposed alignment passes through the current cutting formed by the existing A66 at the Carkin Moor Scheduled Monument. To minimise the impact on the monument, the vertical alignment of the road has been lifted within the existing cutting and a retaining structure has been provided to the southern boundary. The existing connection between the A66 and Warrener Lane will be removed, and a new link provided between Warrener Lane and the de-trunked A66. Plate 3-7 Stephen Bank to Carkin Moor scheme extent-- presents an overview of this scheme.

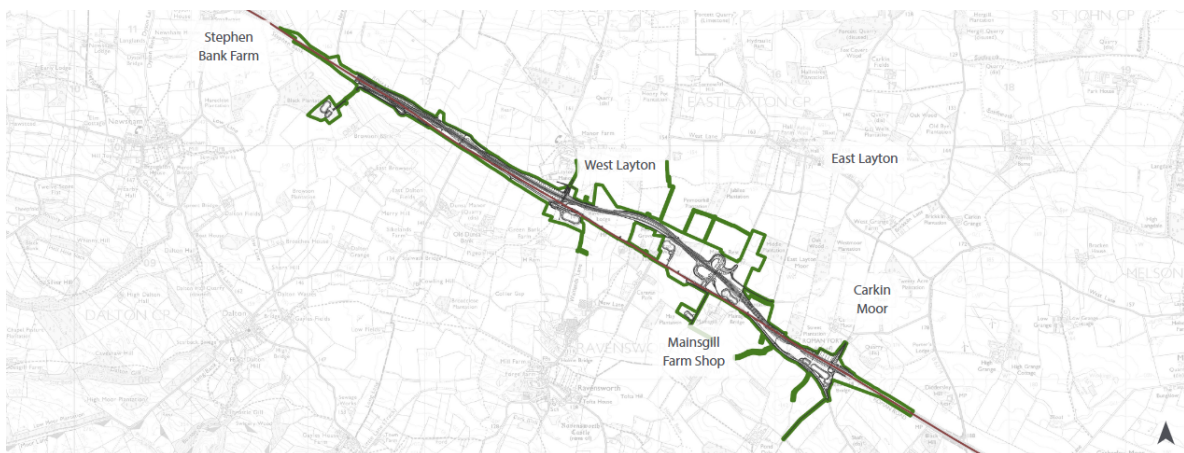


Plate 3-7 Stephen Bank to Carkin Moor scheme extent

A1(M) Junction 53 Scotch Corner

- 3.2.14 The existing Middleton Tyas Lane approach at Scotch Corner roundabout will be widened from one lane to two lanes. A section of existing footway and existing signage and lighting columns will require relocation to the edge of the widened carriageway, and road markings will require amendment to tie in with the existing arrangement. An additional lane will also be provided on the northern bridge of the circulatory carriageway, increasing the provision in this area to three lanes. Plate 3-8 A1(M) Junction 53 Scotch Corner scheme extent-- presents an overview of this scheme.

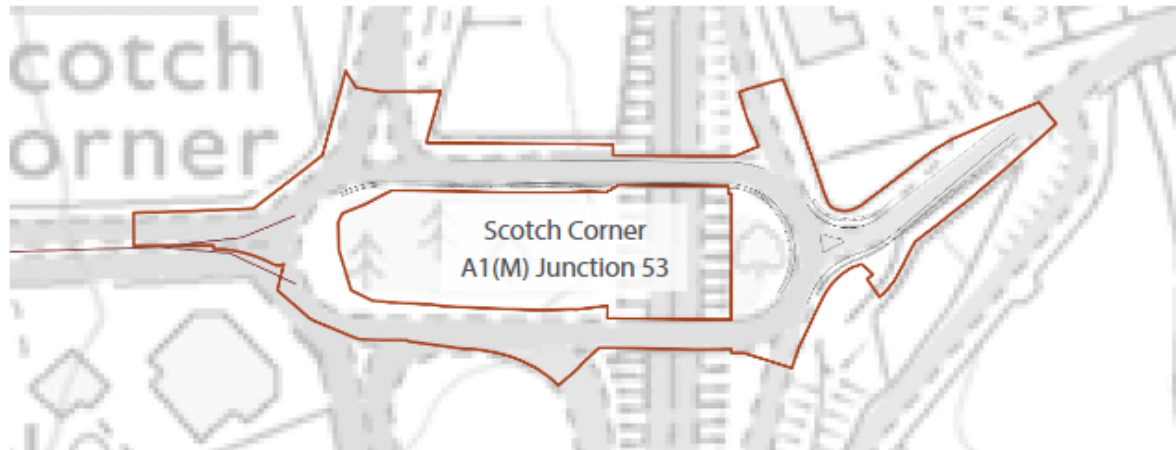


Plate 3-8 A1(M) Junction 53 Scotch Corner scheme extent

Measures to avoid, prevent or reduce significant effects

- 3.2.15 National Highways recognises the environmental and social importance of completing the construction of, and operating, the Project in an environmentally sustainable and responsible manner, ensuring a high level of environmental performance.
- 3.2.16 The Project includes a range of design measures that have been developed to avoid, reduce or offset likely significant adverse environmental effects including, but not limited to, the following:
- Open span structures over tributaries of the River Eden to minimise impacts on the designated site flood plain.
 - Use of landscaping and earthworks to reduce noise and visual effects of new sections of road.
 - Engagement with local landowners to ensure connectivity of land is maintained where practicable.
 - Alteration of alignments to avoid Scheduled Monuments.
 - Careful consideration of junction arrangements to minimise impacts on Registered Parks and Gardens.
 - Identification of habitat replacement and enhancement sites.
 - Fencing, connective hedgerow and tree planting and crossing points have been incorporated into the design across the Project to reduce impacts on protected species such as red squirrel, badger, bats and barn owl.
- 3.2.17 The Project will also include improvements to the management of existing drainage systems from the A66. Each scheme has been designed to minimise the impacts on the local water environment using features such as attenuation ditches and storage ponds to manage surface water flooding and improve water quality before release into the wider environment.
- 3.2.18 These aspects of design are set out in the Project Design Principles (Application Document 5.11) and the Environmental Management Plan (EMP) (Application Document 2.7) to ensure that they are embedded into the Project as it develops.

3.2.19 During construction, the Project’s potential adverse impacts will be avoided or reduced by the implementation of industry standard practice and control measures which will be contained within an EMP.

3.2.20 The EMP is included in the DCO application and will be further developed and implemented by the Principal Contractor. Alongside proposed mitigation measures and controls, it will include the approach to monitoring of both construction activities and the performance of mitigation measures as appropriate. How mitigation measures could be applied are presented on the Environmental Mitigation Maps (Application Document 2.8).

3.3 Construction approach and programme

3.3.1 Should the DCO be granted, the Project’s main construction works are planned to start in 2024 and the full route is expected to be fully open to traffic in 2029. The setup of construction compounds and early surveys will be undertaken ahead of this construction period where feasible and permitted. The amount of time required for each scheme within that period will vary depending on the scale and complexity of the scheme as shown indicatively in Plate 3-9 Programme .

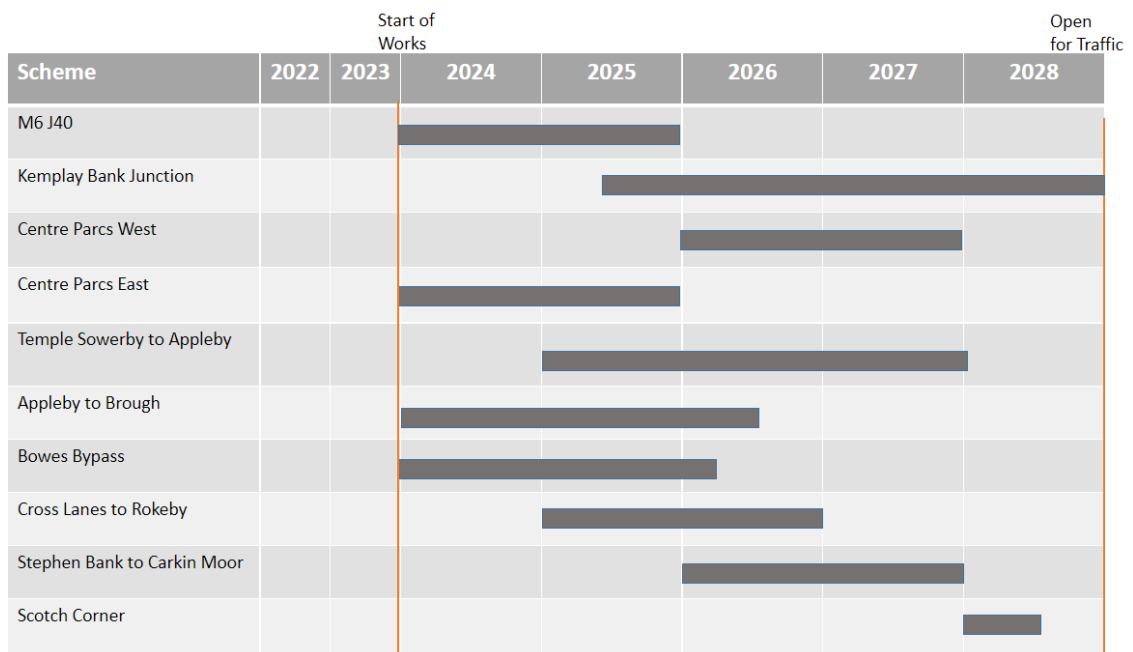


Plate 3-9 Programme

3.3.2 Construction of the Project is expected to require three main construction compounds (one located in the M6 Junction 40 to Kemplay Bank scheme, one at the Temple Sowerby to Appleby scheme and one at the Stephen Bank to Carkin Moor scheme) and several smaller compounds across the full extent of the eight schemes (see ES Chapter 2: The Project (Application Document 3.2)).

3.3.3 Traffic management measures will be put in place to minimise impacts on traffic flows on the existing A66 and other local roads.

3.3.4 Material and waste management measures will be in place to minimise the need to move material between schemes. These measures have been set out in the EMP and its supporting appendices.

3.4 Alternatives studied and consultation

3.4.1 Work into improvement of connectivity in the North of England has been ongoing for some time, with studies on improving connectivity being undertaken since 2014. Since 2018, that work has focused on proposals for the improvement of the A66 between M6 Junction 40 at Penrith and the A1(M) Junction 53 Scotch Corner.

3.4.2 Further information on the alternatives considered and the factors that affected decision making, including environmental factors, is set out in the Project Development Overview Report (Application Document 4.1) and ES Chapter 3: Assessment of Alternatives (Application Document 3.2). A broad summary of National Highways design approach is set out below:

- Pre-Project - Where a problem has been identified, solutions are considered at a regional scale.
- Stage 1 - Options Identification involves identifying broad route options to be taken to consultation.
- Stage 2 - Options Selection wherein the options identified as part of Stage 1 go through further assessment in order to determine the Preferred Route.
- Stage 3 - Preliminary Design is the stage at which the Preferred Route is developed and the supporting assessment and documentation is prepared, culminating in the application for permission. In the case of the A66, this takes the form of this DCO application.

3.4.3 The potential impact of each of the options on the environment has been an important consideration throughout the option identification and selection process and has been a key influence in decision-making.

Pre-Project

3.4.4 A Strategic Study (Highways England, 2016)¹ was completed, to understand the pressures on the route and work out the best options to resolve them. Two route corridors were considered within this study, the A66 or the A69 between Carlisle and Newcastle.

Stage 1 – Options identification

3.4.5 The route was divided into a number of schemes, for each a number of options were developed which were combined into two high-level 'routes' for the purpose of assessment - the longest and shortest route.

3.4.6 Routes and the schemes they were made up of were assessed for "showstoppers" in regard to progressing the Project i.e. unacceptable impact on national and international designations such as SACs, Site of Special Scientific Interest (SSSI), AONBs, Scheduled Monuments, listed buildings and Registered Parks and Gardens.

¹ Highways England (2016) Northern Trans-Pennine Routes Strategic Study

- 3.4.7 A number of options were rejected based on the following reasons:
- unacceptable land take within Scheduled Monuments.
 - direct impacts on listed buildings and listed structures.
 - damaging crossings of the River Eden SAC.
 - loss of irreplaceable ancient woodland.
 - unacceptable extent of direct landtake and loss of important features of the North Pennines AONB.
 - loss of heritage railway.

Stage 2 - Options selection

- 3.4.8 Long list options not ruled out during options identification were taken forward for further assessment. Further field surveys were undertaken alongside preliminary flood modelling and engagement with Natural England, Historic England and the Environment Agency.
- 3.4.9 This design stage culminated in a Preferred Route which was published in the Scheme Assessment Report (Application Document 4.2) in January 2020.

Stage 3 - Preliminary design

- 3.4.10 At this stage, the Project was divided into the schemes set out in the Project description. Ongoing design was split out between them, some refining the Preferred Route and some developing alternatives where further work had identified additional constraints to be avoided or opportunities for a less impactful scheme.
- 3.4.11 There were three schemes where alternatives were considered:
- Temple Sowerby to Appleby - alternative routes were to be considered due to the potential impact on Trout Beck (River Eden SAC) where the new A66 was to cross it. Three alternatives were developed, including an amended version of the Preferred Route alignment through this scheme. Two of these included a crossing raised up on a viaduct to minimise impact on the flood plain of Trout Beck, while the third involved an online upgrade to avoid the requirement of a new crossing.
 - Appleby to Brough - a balance was needed to be found between impacts to local communities and the North Pennines AONB. The scheme was split up into three sections with alternatives developed for the central and eastern sections, with slight variation on alignment and road height.
 - Cross Lanes to Rokeby - two alternative junction arrangements at Cross Lanes and two junction arrangements at Rokeby to reduce the impact to traffic flows while also minimising impacts to the Rokeby Park Registered Park and Garden.
- 3.4.12 These options were brought forward into Statutory Consultation undertaken between September and November 2021 to allow for comment to be made on preference of alternatives that could be taken into account in further development of the schemes. The final routes were chosen following Statutory Consultation and further design refinement was undertaken across the Project based on feedback received and further assessment:

- Junction location for Kirkby Thore on the selected Temple Sowerby to Appleby route.
- Junction layout for Long Marton and Appleby on the selected Temple Sowerby to Appleby route.
- The route alignment north of Sandford on the Appleby to Brough route.
- Design of the selected route at Warcop, to minimise impacts on watercourses north of Warcop following survey that demonstrated they are functionally linked to the River Eden SAC.
- Location of the replacement site for Brough Hill Fair.
- Closure of the existing central reserve gaps and upgrade of the junction geometry at Hulands Quarry to address safety considerations raised by the operators and the public. The existing central reserve gap at Bowes Cross Farm will also be closed, along with the access onto the A66.

3.4.13 These changes were taken into supplementary consultation in Spring 2022, no further changes arose from this consultation.

3.4.14 Details of the consultation undertaken to date can be found in the Consultation Report (Application Document 4.4). In addition to formal consultation, extensive and regular engagement has been undertaken throughout the lifecycle of the Project to inform the design. This includes local landowners, the multiple local authorities, Natural England, Historic England and the Environment Agency.

4 Assessment of likely significant effects

- 4.1.1 Under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, the Project is defined as the type and scale of development that automatically requires an Environmental Impact Assessment (EIA). Accordingly, an EIA has been undertaken to meet the requirements of the relevant planning policy and legislation and assess the effects of the Project on the environment.
- 4.1.2 The EIA considers impacts during the construction and operation of the Project. The construction phase assessment addresses both the temporary activities involved in building the Project and the subsequent permanent presence of the Project once constructed. Where relevant, these temporary and permanent effects are described separately below. The operational assessment considers the situation when the Project is being used by traffic once it is opened.

4.2 Methods used in the assessment

- 4.2.1 The approach to the EIA comprised gathering information to establish the environmental setting or baseline, considering the potential impacts of the Project, developing measures to avoid, prevent or reduce adverse impacts and then assessing the resultant likely significant effects of the Project on local communities and the environment. The EIA has followed industry standard methods, including for establishing significance, set out in National Highways' Design Manual for Roads and Bridges (DMRB) along with topic-specific guidance as appropriate. Each topic chapter in the ES provides further detail regarding the specific methodology applied.
- 4.2.2 This assessment has been undertaken against both the current baseline setting of the Project and potential changes to the Project's baseline setting at the time of construction and the future operation (the "future baseline"). Future changes to the baseline, without the Project, could result from both natural events such as the movement of protected species, or from human activities, such as the development of homes and businesses in the area.
- 4.2.3 In accordance with the EIA Regulations, an assessment was undertaken of the vulnerability of the Project to major accidents or disasters. The assessment considered a wide range of events including naturally occurring events such as lightning strikes, floods and heatwaves; human accidents such as road, aircraft and military accidents; infrastructure failure such as tunnel, bridge, utilities or dam failure; and bomb, vehicle and cyber-attacks. It was concluded that with the mitigation measures already included in the design of the Project, no significant adverse effects from major events are expected.
- 4.2.4 The following sections provide a summary of the assessment of likely significant environmental effects as a result of the Project on an environmental topic basis. The significant effects set out in this Non-Technical Summary are those that remain following the implementation of required mitigation, referred to as residual effects. Further detail on effects before mitigation can be found in the relevant topic chapters. Assessment has been undertaken on a scheme-by-scheme basis; however, some

topics assess on an overall Project-wide scale as a result of the nature of the topic itself.

4.3 Air quality

Baseline

- 4.3.1 Air quality in the area around the Project is considered to be good. This is confirmed by the fact that there are no Air Quality Management Areas (AQMA) close to the Project, with the nearest being over 30km from the A66 (Durham and Chester-le-Street AQMA). AQMA are areas which the local authority has identified as requiring management to achieve desired air quality objectives.
- 4.3.2 Large numbers of statutory and non-statutory designated ecological receptors are close to the Project and close to roads affected by the Project, which have the potential to experience changes in air quality. Existing background nitrogen deposition levels at all of the statutory sites are considered in the assessment, including North Pennine Moors SAC and SPA, Asby Complex SAC, Bowes Moor SSSI, Temple Sowerby SSSI, Augil Valley Pastures SSSI and Argill Woods Pastures SSSI.

Construction

- 4.3.3 Without mitigation, construction of the Project could temporarily impact air quality as a result of dust and particulate matter from construction activities such as demolition, earthworks, construction and vehicle movements. The quantities of each depend on the scale and intensity of the construction works.
- 4.3.4 Dust has the potential to cause nuisance to property, and very high levels of soiling can affect plants and ecosystems. There is the potential for dust nuisance on receptors within 200 metres of construction and haulage routes associated with the Project. Approximately 1,467 human receptors fall into this area, as well as ecological sites. Mitigation measures in the EMP will include dampening of dust generating activities, road sweeping and appropriate management of material while stockpiled and in transport. These will minimise the temporary impacts during construction activities to a negligible level.
- 4.3.5 In addition, potential air quality effects may arise from emissions from site plant equipment and heavy goods vehicles (HGV), and also from changes in traffic flows along the Project and wider road network with traffic management in place. Due to the nature of the Project, large quantities of material will be required during construction and therefore transportation of these materials will be necessary on the local road network and designated haul routes. As there are few east to west alternative Trans-Pennine routes to the A66 and the requirement for both online and offline working, an extensive traffic management programme will be implemented for the Project (refer Annex B13 Construction Traffic Management Plan of the EMP (Application Document 2.7)). Dedicated haul routes will be considered and established to mitigate impacts of moving the material on stakeholders and the environment and will avoid the central areas of the

A66 close to designated ecological habitats, including for example North Pennine Moors SAC and Bowes Moors SSSI.

Operation

- 4.3.6 During operation, changes to the road network will result in changes to traffic flow, speed and the types of vehicle using the A66 and the wider road network once the scheme is complete. Once the Project is operational, traffic flows and speeds are likely to rise due to the improved desirability of the route, improved capacity, and reduced congestion.
- 4.3.7 These changes will impact emissions of the main traffic related pollutants, NO_x and PM₁₀. As a result, pollutant concentrations will be affected by changes to traffic as a result of the Project. These changes may result in permanent improvements and deteriorations in local air quality. As a result of these changes, pollutant concentrations at receptors within the air quality study area will be affected by the Project.
- 4.3.8 Modelling has predicted there will be no exceedances of the respective NO₂, PM₁₀ and PM_{2.5} Air Quality Objectives at human receptor locations.

Summary

- 4.3.9 Summary of **construction** assessment:
- No significant effects during construction due to emissions of dust from construction activities are likely following the implementation of mitigation set out in the EMP.
 - No significant effects for human health due to traffic emissions during the construction phase are likely following the implementation of mitigation set out in the EMP.
 - No significant effects for ecological receptors due to traffic emissions during the construction phase are likely following the implementation of mitigation set out in the EMP.
- 4.3.10 Summary of **operational** assessment:
- No significant effects for human health due to traffic emissions during the operational phase are likely.
 - No significant effects for ecological receptors due to traffic emissions during the operational phase are likely.

4.4 Biodiversity

Baseline

- 4.4.1 Across the extent of the Project there is considerable biodiversity. Within proximity of the Project there are:
- 18 statutory designated sites five of which are also within 200 metres of the ARN. This includes two within the Order Limits of the Project:
 - River Eden SAC
 - River Eden and Tributaries SSSI

- 27 non-statutory designated sites, seven of which are within 200 metres of the ARN and there are a further 42 within 200 metres of the ARN. This includes three within the Order Limits of the Project:
 - Skirsgill Wood CWS
 - Chapel Wood (Appleby in Westmoorland) CWS
 - Rokeby Park and Mortham Wood Local Wildlife Site (LWS)
- 16 Ancient Woodlands and a further 15 within 200 metres of the ARN. This includes three within the Order Limits of the Project:
 - Skirsgill Wood CWS
 - Chapel Wood CWS
 - Graham's Gill/Jack Wood
- Habitats of ecological interest – broadleaved woodland, semi-improved acid grassland, lichen/bryophyte heath, swamp, marshy grassland, mixed park/scattered trees, hedgerows and standing water
- Multiple protected species including, but not limited to, amphibians such as great crested newt, badger, red squirrel, bats, brown hare, polecat, hedgehog, breeding birds, migratory birds, barn owl, otter, water vole and white-clawed crayfish.

4.4.2 Desk-based information was combined with the following field surveys to inform the potential effects of the Project on the biodiversity in the area:

- phase 1 habitat
- hedgerow
- amphibians
- reptiles
- terrestrial invertebrate
- terrestrial mammals such as badger and red squirrel
- bats
- breeding and wintering birds
- barn owl
- otter
- water vole
- aquatic features such as macrophytes, aquatic invertebrates and white-clawed crayfish.

Construction

4.4.3 The majority of potential impacts affecting biodiversity features will occur during the construction phase. These impacts can be broadly summarised into the following:

- Habitat loss permanently or temporarily under the road itself or where it is removed as a result of working area and compounds
- Fragmentation of populations and habitats where changes to noise, air quality, hydrological regimes and human presence may change the movement of mobile species
- Disturbance to species by changes to noise, light and human activity that may affect the behaviour of sensitive species, particular breeding or wintering birds

- Habitat damage or degradation that might arise from changes to water quality or air quality
- Incidental species mortality as a result of construction activities such as vegetation clearance, tree felling, vehicle movements and topsoil stripping

4.4.4 Mitigation measures to reduce and manage these impacts include the implementation of an EMP, supported by a number of method statements, throughout construction which specifies scheme and/or species-specific measures to minimise effects. This will be supported by the requirement for an Ecological Clerk of Works (ECoW) throughout construction whose primary role will be to identify, supervise and monitor key activities and areas that are identified as having a risk to the local biodiversity.

Operation

4.4.5 Operational impacts of the Project on biodiversity features can be summarised into the following:

- Fragmentation of populations and habitats as a result of the east-west alignment of the Project resulting in ongoing severance of north-south movement.
- Disturbance as a result of changes to operational traffic flows and resulting changes to noise, air quality, light and human disturbance.
- Habitat damage can occur as a result of changes to hydrological regimes, or long-term changes to nitrogen content affecting plant life.
- Incidental species mortality due to animals having to cross the road and being hit by vehicles.

4.4.6 The Project includes measures to mitigate severance impacts and reduce mortality risk through the provision of a number of safe crossing points for species, including culverts, underpasses and green bridges. Many of these are supported with the provision of fencing to guide species to these safe crossing points and encourage their use.

4.4.7 The Project includes the provision of several structures which will facilitate species movement. These include otter culverts, mammal underpasses, green bridges and bat houses, which will provide connectivity across the Project.

4.4.8 The Project will also include wider measures to mitigate impacts or enhance existing biodiversity through extensive habitat creation and enhancement.

4.4.9 An air quality assessment of significant effects on designated sites was undertaken in line with DMRB LA105 Air Quality (Highways England, 2019) in conjunction with other sources of information including desk study information and survey information, where available. Professional judgement and ecological principles were then applied in concluding the assessment. No significant effects were identified.

Summary

4.4.10 Summary of **construction** assessment:

- No significant effects in the construction phase on any designated site are likely.
- There are likely to be significant temporary adverse impacts on priority habitats within the Order Limits during construction due to direct loss and habitat degradation, however these effects will be temporary as replacement planting will be carried out within the construction phase. This planting will establish through the operational phase to the point that it will have replaced the habitat lost in the construction phase. No significant residual effects are likely.
- No significant effects in the construction phase on any protected species assessed are likely.

4.4.11 Summary of **operational** assessment:

- No significant effects in the operational phase on any designated site assessed are likely.
- Significant permanent adverse effect on barn owl at Temple Sowerby to Appleby and Stephen Bank to Carkin Moor. This is a result of new carriageway increasing barn owl mortality in areas known to be used by foraging and commuting barn owl at locations where planting to encourage barn owls to stay away from the carriageway may not be possible for safety reasons.

4.5 Climate

Baseline

- 4.5.1 The assessment of climate includes the effects of greenhouse gas (GHG) emissions associated with the Project during both construction and operation. Consideration is also given to the resilience of the Project to cope with future extreme weather events associated with UK climate projections.
- 4.5.2 Estimated baseline operational GHG emissions associated with vehicles using the existing highways infrastructure is expected to total 74,971,735 tCO₂e over the 60-year appraisal period.
- 4.5.3 The Highway's Agency Drainage Data Management System (HADDMS) shows that the study area has already experienced a number of significant flood events. UK Climate Projections predict an increased likelihood of warmer, wetter winters and hotter, drier summers, in addition to an increase in the frequency of extreme weather.

Construction

- 4.5.4 Total route wide emissions associated with construction are estimated to be 518,562 tCO₂e. The largest source of emissions during the construction phase of the Project is expected to arise from construction materials, including sourcing, processing and manufacture.
- 4.5.5 These estimated construction emissions will represent 0.027% of the Fourth Carbon Budget and 0.030% of the Fifth Carbon budget and so are not considered significant as the Project in isolation will not have a material impact on the ability of the government to meet its carbon budgets.

- 4.5.6 GHG emissions have been minimised where possible through design and will continue to be minimised during construction through measures included within the EMP. These measures include: reducing construction traffic through careful planning, use of low-emission fuels, maximising opportunities for use of renewable energy within compounds and reuse of materials.
- 4.5.7 Potential climate change risks during construction such as increased health and safety risks and damage to construction materials are expected to be mitigated through codes of practice and construction mitigation measures included in the EMP.

Operation

- 4.5.8 Total 'net' (i.e. GHG remaining after accounting for changes in land use such as increasing area of planting and trees) route wide emissions associated with operation over the 60-year appraisal period are estimated to be 77,015,521 tCO₂e. The largest source of emissions during the operational phase of the Project is expected to arise from vehicles using the highways infrastructure.
- 4.5.9 These estimated operational emissions will represent 0.019% of the Sixth Carbon Budget and so are not considered significant as the Project in isolation will not have a material impact on the ability of the government to meet its carbon budgets.
- 4.5.10 The establishment of habitats and landscape planting created during construction will contribute to the reduction of CO₂ emissions in operation. The Project has been designed to limit operational GHG emissions through the use of appropriate design standards, embedded mitigation, biodiversity and landscape planting and appropriate asset management procedures during operation.
- 4.5.11 The preliminary assessment of the resilience of the operational phase of the Project to climate change identified a number of climate change risks that present a significant risk to the Project. However, following the inclusion of additional mitigation measures, the likelihood and consequence of all climate change risks on the Project are considered to be sufficiently reduced to be assessed as not significant.

Summary

- 4.5.12 Summary of **construction** assessment:
- No significant effect from GHG emissions as a result of the construction phase are likely as the likely emissions are considered low in the context of the relevant Carbon Budgets.
 - During the construction phase, the climate is not likely to have changed to the extent that there will be a significant difference in the vulnerability of the Project, therefore there was no effect likely and this was scoped out of this assessment.
- 4.5.13 Summary of **operational** assessment:

- No significant effect from GHG emissions as a result of the operational phase are likely as the likely emissions are considered low in the context of the relevant Carbon Budgets.
- It is likely that there will be a number of features of climate change that could pose a risk to several schemes within the Project, however it is considered that, having identified them, further design and additional planning can offset this risk. It is therefore considered that there is no significant effect on the Project.

4.6 Cultural heritage

Baseline

4.6.1 Cultural heritage includes archaeology, historic buildings/structures and historic landscapes including parks and gardens. The existing A66 runs through a landscape of considerable historical interest, in many places broadly following the alignment of an ancient Roman Road. There is archaeological evidence present across the Project dating from Prehistoric times up to the Second World War. The landscape comprises historical assets including Roman scheduled monuments, listed buildings, Rokeby Registered Park and Garden and conservation areas in addition to non-designated sites ranging from find scatters to a rifle range.

Construction

4.6.2 Construction activities could lead to temporary adverse effects on the setting of a number of heritage assets, including partial or total removal of heritage assets within the Project footprint, compaction of archaeological deposits by construction traffic and structures, impacts upon the settings of the heritage resources and changes to key views and sightlines.

4.6.3 Essential mitigation of construction impacts will include measures that reduce the likelihood of physical damage to heritage assets as well as changes to the setting that affect the significance of the heritage assets. An investigation of archaeological remains prior to construction and the analysis of artefacts and publication of results following the construction will minimise the direct impacts on archaeological remains. Historic England and the Cumbria, County Durham and North Yorkshire Archaeological Officers will be further consulted about the type and location of mitigation required, as set out in the EMP and the Heritage Mitigation Strategy, which is an Annex to the EMP (Application Document 2.8).

4.6.4 The nature of the construction phase means that the majority of impacts are temporary and will not extend beyond the construction phase itself. Exceptions to this, where there are permanent adverse effects after mitigation arising from the construction phase through direct loss or permanent setting changes, include the following features:

- Brougham Roman fort (Brocavum) and civil settlement and Brougham Castle Scheduled Monument and Brougham Vicus Roman settlement site Scheduled Monument (Penrith to Temple Sowerby)

- The ring ditches at Brougham as recorded on the Cumbria Historic Environment Record (Penrith to Temple Sowerby)
- Two areas of peat deposits likely associated with nearby palaeochannels (Penrith to Temple Sowerby)
- An Enclosure and other features north-west of Kirkby Thore identified during trial trenching (Temple Sowerby to Appleby)
- A Prehistoric round house drip gully and associated features identified during trial trenching (Temple Sowerby to Appleby)
- Warcop Roman Camp Scheduled Monument (Appleby to Brough)
- Sandford Moor Barrows group, should any evidence of them remain in situ (Appleby to Brough)
- Roman trackway and associated features (Appleby to Brough)
- Prehistoric features north of Warcop (Appleby to Brough)
- A group of three Grade II listed buildings, Stone Bridge Farmhouse, Loose boxes, 5 metres east of Stone Bridge Farmhouse, and linked farm buildings and gin-gang attached to south of Stonebridge Farmhouse (Bowes Bypass)
- Roman Fort and Prehistoric enclosed settlement 400 metres west of Carkin Moor Farm Scheduled Monument (Stephen Bank to Carkin Moor)

4.6.5 Where the Project is contained within the existing A66 footprint, and alongside areas that had been previously disturbed, it is likely that as-yet unknown archaeological remains will have been previously substantially or wholly removed. However, where the Project requires excavation below the existing ground surface in areas that had not been previously developed, then it is possible that archaeological remains may exist.

Operation

4.6.6 The operational phase of the Project could lead to beneficial and adverse effects on the setting of cultural heritage assets through traffic noise and the visibility of moving vehicles on the road. The above identified permanent adverse impacts that will occur during construction will continue to be experienced throughout the operational phase of the Project.

4.6.7 Additional permanent operational significant effects are expected to include:

- Significant beneficial effect of new footway and parking area for the Countess Pillar Scheduled Monument and associated Alms Table (Penrith to Temple Sowerby).
- Significant beneficial effect improved junction and parking area for St Ninian's Church Scheduled Monument and listed building (Penrith to Temple Sowerby).
- Significant adverse effects to a group of three Grade II listed buildings, Stone Bridge Farmhouse, Loose boxes 5 metres east of Stone Bridge Farmhouse impacted by increase in noise and busyness of increased traffic volume (Bowes Bypass).

Summary

4.6.8 Summary of **construction** assessment:

M6 Junction 40 to Kemplay Bank

- This scheme is expected to result in significant temporary adverse effects to two heritage assets during construction.

Penrith to Temple Sowerby

- This scheme is expected to result in significant temporary adverse effects to three heritage assets and significant permanent adverse effects to five heritage assets during construction.

Temple Sowerby to Appleby

- This scheme is expected to result in significant temporary adverse effects to four heritage assets and significant permanent adverse effects to two heritage assets.

Appleby to Brough

- This scheme is expected to result in significant temporary adverse effects to one heritage asset and significant permanent adverse effects to seven heritage assets.

Bowes Bypass

- This scheme is expected to result in significant temporary adverse effects to three heritage assets and significant permanent adverse effects to three heritage assets.

Cross Lanes to Rokeby

- No significant effects expected on any heritage asset present within this scheme.

Stephen Bank to Carkin Moor

- This scheme is expected to result in significant permanent adverse effects to two heritage assets.

A1(M) Junction 53 Scotch Corner

- No significant effects expected on any heritage asset present within this scheme.

4.6.9 Summary of **operational** assessment:

M6 Junction 40 to Kemplay Bank

- No significant effects expected on any heritage asset during operation.

Penrith to Temple Sowerby

- This scheme is expected to result in significant permanent beneficial effects to four heritage assets during operation.

Temple Sowerby to Appleby

- No significant effects expected on any heritage asset during operation of this scheme.

Appleby to Brough

- No significant effects expected on any heritage asset during operation.

Bowes Bypass

- This scheme is expected to result in significant permanent adverse effects to three heritage assets during operation.

Cross Lanes to Rokeby

- No significant effects expected on any heritage asset during operation.

Stephen Bank to Carkin Moor

- No significant effects expected on any heritage asset during operation.

A1(M) Junction 53 Scotch Corner

- No significant effects expected on any heritage asset present within this scheme.

4.7 Geology and Soils

Baseline

- 4.7.1 The underlying geology across the Project is comprised of bedrock geology of Carboniferous age sandstones, siltstones, mudstones, limestones and some coals west of Penrith and from Brough to the A1(M) at Scotch Corner. The main western section from Penrith to Brough comprises Permian aged, sandstones and shales. The Carboniferous strata comprises the Stainmore Formation, the Great Limestone Member, the Alston Formation and Four Fathom Limestone Member.
- 4.7.2 Made Ground is expected to be encountered in multiple areas across the Project where previous and existing development and highway construction has occurred. Overlying natural deposits include alluvium (sand, silt, or clay) associated with watercourses, river terrace deposits (sand and gravels), and glacial deposits (layers of sand, gravel and cobbles). Peat deposits exist locally, but only in a small number of locations.
- 4.7.3 There is a Mineral Safeguarding Area for gypsum deposits in the Long Marton and Kirkby Thore area where British Gypsum operates an existing mine and plasterboard factory.
- 4.7.4 The majority of soils are classified as moderate, good, or very good quality agricultural land and urban land within the study area. A number of possible sources of contamination have been identified including railway land, disused quarries, landfill sites, industrial land uses and farms. The study area of sections of the scheme include part of the North Pennines UNESCO Global Geopark, which is in the same of that of the North Pennines AONB.

Construction

- 4.7.5 In the construction phase of works there is potential for impacts to arise from the encountering of contaminated material, impacts to geodiversity and to agricultural soils.
- 4.7.6 Without mitigation, there is the potential for construction to disturb contaminants to enter surface water, groundwater, or soil through

mobilisation and runoff following ground disturbance or de-watering activities during construction. This would result in potential introduction of new contaminants and/or mobilisation of contaminants already present which could negatively impact human, ecological or controlled water receptors.

- 4.7.7 The EMP contains measures to ensure compliance with relevant standards and legislation. The measures contained within the EMP are designed to limit the possibility for dispersal and accidental releases of potential contaminants, soil derived dusts and uncontrolled run-off to occur during construction. The EMP also establishes procedures for dealing with unexpected soil or groundwater contamination that may be encountered.
- 4.7.8 There are potential impacts to the enjoyment of the AONB Geopark during construction by limiting access due to health and safety constraints, and NH will engage with UNESCO to identify potential enhancement opportunities at the Geopark.
- 4.7.9 Construction works will lead to direct and indirect loss of soil of high agricultural value. Measures to limit the potential for agricultural soil loss, changes to soil structure from compaction by plant and vehicles, and the effects of dust and water run-off on areas outside of the construction areas will also be included in the EMP.
- 4.7.10 Mitigation employed will measures include employing high standards of soil handling and management during construction and avoiding the creation of bare areas of exposed soil that would be vulnerable to erosion processes. Topsoil stripped during the construction of the Project will be re-used as soon as it is practicable and stored in such a way as to minimise structural damage from weathering, construction traffic movements, and multiple handling. This will also minimise the potential for leaching of nutrients from soils. Excavated material will be managed by a Materials Management Plan and a Soils Management Plan that will sit within the EMP.
- 4.7.11 With mitigation, the only residual effects will be the loss of soil resource constituting a significant adverse effect to very good and good agricultural soils as a result of both permanent loss and temporary land take. This is likely at all schemes within the Project with the exception of the A1(M) Junction 53 Scotch Corner which does not result in any significant effects to geology or soils.

Operation

- 4.7.12 Without mitigation, operation of the road could lead to pollution impacts on surface water and groundwater from road run-off and potentially impact on soil quality. The design of the Project includes measures that will contain and control any releases of contaminants along the highway and its associated infrastructure such as drainage control.
- 4.7.13 The drainage proposals for the Project includes measures to contain and control surface water run-off from the highway as set out in the EMP and ES Appendix 14.2 Flood Risk Assessment and Outline Drainage Strategy (Application Document 3.4). Further, permanent land take will encroach on the southern boundary of the AONB and UNESCO Global Geopark. The

design of the Project has minimised the negative impacts by reducing the extent to which the works are situated within the designated sites as much as practically possible.

Summary

4.7.14 Summary of **construction** assessments:

- Significant adverse permanent and temporary effects on very good, good, and moderate quality agricultural soils are likely during construction of every scheme with the exception of A1(M) Junction 53 Scotch Corner.

4.7.15 Summary of **operational** assessment:

- No significant effects are likely during operation.

4.8 Landscape and visual

Baseline

4.8.1 The Project passes through a broad spectrum of landscape features along the A66 Trans Pennine route from the M6 Junction 40 in the west to the A1(M) in the east. The route transitions from the environment of the national motorway network to a more agrarian character with views of upland environments. This includes high moorland, river valleys and a distinctive landscape pattern of agricultural land bounded by mature trees, hedges and dry-stone walls.

4.8.2 The route from the M6 junction follows the landscape features of the River Eamont and River Eden valleys before crossing the uplands of Stainmore on the lower slopes of the Pennines. It then follows the River Greta valley to the connection with the A1 (M) at Scotch Corner. The range of elevations the route navigates has an influence on both the land use and the scattered settlement patterns. The land use within the scheme is predominantly rural, with areas of residential small villages, towns, farms, military properties and tourism. The following sites are located within 7km of the Project:

- The Lake District National Park
- The English Lake District World Heritage Site
- The North Pennines AONB
- The Yorkshire Dales National Park
- Dales Fringe Area of High Landscape Value, a non-statutory locally designated landscape in County Durham
- Four inventoried Registered Parks and Gardens
- Conservation areas including the Settle to Carlisle conservation area and East Layton conservation area.

4.8.3 The existing A66 is a busy transport link comprised of sections of dual carriageway interspersed with sections of single carriageway, which sometimes results in traffic congestion.

Construction

- 4.8.4 During construction, there will be direct physical impacts on landscape character features and elements such as trees, woodland, hedges, drystone walls and alteration of features such as field pattern, size and shape and changes to topography, landform and rural lanes and byways.
- 4.8.5 There is likely to be significant adverse visual impacts associated with the presence of construction vehicles, traffic control and movement and stockpiling of materials. There will also be the effects of temporary lighting and changes in lane markings and diversions. All of these impacts are temporary, but they will create a diminished driver experience for the duration of the construction work.
- 4.8.6 Locations where there are likely temporary adverse significant landscape and visual impacts are as follows:
- **Local Character Areas (LCA)** of Sandstone Ridge, Broad Valleys, Intermediate Farmland, Foothills, East and West Layton Fringe and West Layton.
 - **Broad Character Area** of Urban Area Bowes, Barningham, Brignall and Rokeby.
 - **Residences** along Clifford Road and Skirsgill Lane, Ash Hill Cottages along Cliburn Road, Low Moor Park, Sandersons Croft and Sleastonhow Farm, Bowes, Boldron and Dent House Farm.
 - **Recreational users** of Wetheriggs Park and Mayburgh Henge (off the junction of the B6262 and Moor Lane near Brougham Castle) and two public rights of way (PRoW) in this area, eight PRoW around Kirkby Thore and Crackenthorpe as well as the Eden Valley Cycle Route, five PRoW in the vicinity of Warcop and the Warcop Railway Station, three PRoW around Bowes, as well as the Pennine Way and Clint Lane, four PRoW around Cross Lanes and Rokeby, as well as users of Rokeby Park and the Church of St Mary and nine PRoW around Stephen Bank to Carkin Moor as well as visitors to Mainsgill Farm.
 - **Motorists and pedestrian users** of the A6, the minor road south of High Moss Woodland leading to the properties of Lane Ends, Long Marton Road, Sleastonhow Lane and Priest Lane, the minor road leading to Moor House Farm, of the B6259, on and adjacent to The Street, of Barnard Castle Road and of Colliers Lane.
 - Rokeby Historic Park and Garden and associated Church of St Mary.
- 4.8.7 Measures to mitigate the landscape and visual impacts of the construction activities will include limiting construction activity to within the existing perception of the existing A66 road corridor where possible, retaining vegetation and stone walls where practicable, careful consideration of landforms and planting to retain important views, and mitigation measures set out in the EMP to ensure best practice construction measures are implemented.

Operation

- 4.8.8 The Project will result in additional road infrastructure as a result of dualling of the road and construction of new sections of carriageway. The reduction

of existing vegetation and stone boundary walls during construction along the road corridor will locally increase the perception of the road and vehicles.

- 4.8.9 In the first year, road users' experience will be altered by visual impacts due to the presence of tree shelters and the rawness of the landscape before vegetation becomes established. Structures will be more visually intrusive due to the lack of material weathering and the early stage of planting vegetation. As time progresses, and landscape mitigation is able to establish further, it is expected that many adverse impacts will reduce.
- 4.8.10 Measures to mitigate impacts include replacing lost landscape features where practicable and to offset impacts on landscape character. Additional landscape planting has been incorporated into the design with the intention to screen vehicles along the length of the dual carriageway where appropriate, and to mitigate and enhance ecological connectivity and habitats. Embedded mitigation has been included in the design to mitigate impacts to landscape character such as false cutting and landscape earthworks in addition to reinstatement of historic field patterns with locally characteristics materials.
- 4.8.11 During operation, the visual screening from mature vegetation will eventually be restored along the road corridor to a similar extent as the existing conditions before construction. The landscape will be fully vegetated and the surfaces of structures will have weathered. However, significant effects are still predicted for some receptors at year 15 of operation due to the change relative to the baseline, particularly where the alignment is offline.
- 4.8.12 Long term (15 years into the operation) significant adverse landscape and visual effects across the Project are likely to be as follows:
- Local Character Areas of Broad Valleys and Intermediate Farmland.
 - Recreational users of nine PRoW .
 - Motorists and pedestrians of Priest Lane, on and adjacent to The Street and on Colliers Lane.
 - Recreational users of Warcop Railway Station.
 - Residences in Dent House Farm.
 - Recreational users of Rokeby Park and the Church of St Mary.
 - Visitors to Mainsgill Farm.

Summary:

4.8.13 Summary of **construction** assessment:

M6 Junction 40 to Kemplay Bank

- During construction, this scheme is expected to result in significant temporary adverse effects to residences, users of recreational sites and PRoW and road users within and in proximity to the Order Limits.

Penrith to Temple Sowerby

- During construction, this scheme is expected to result in significant temporary adverse effects to landscape character areas, residences,

users of recreational sites and PRow and road users within and in proximity to the Order Limits.

Temple Sowerby to Appleby

- During construction, this scheme is expected to result in significant temporary adverse effects to landscape character areas, residences, users of recreational sites and PRow and road users within and in proximity to the Order Limits.

Appleby to Brough

- During construction, this scheme is expected to result in significant temporary adverse effects to landscape character areas, residences, users of recreational sites and PRow and road users within and in proximity to the Order Limits.

Bowes Bypass

- During construction, this scheme is expected to result in significant temporary adverse effects to broad character areas, residences, users of recreational sites and PRow and road users within and in proximity to the Order Limits.

Cross Lanes to Rokeby

- During construction, this scheme is expected to result in significant temporary adverse effects to broad character areas, residences, users of recreational sites and PRow and road users within and in proximity to the Order Limits.

Stephen Bank to Carkin Moor

- During construction, this scheme is expected to result in significant temporary adverse effects to local landscape character areas, residences, users of recreational sites and PRow and road users within and in proximity to the Order Limits.

A1(M) Junction 53 Scotch Corner

- There are no significant effects likely during construction.

4.8.14 Summary of **operational** assessment:

M6 Junction 40 to Kemplay Bank

- There are likely significant adverse effects to Wetheriggs Country Park, Skirsgill Lane and one PRow in year one of operation.
- No significant effects expected by year 15 of operation.

Penrith to Temple Sowerby

- There are likely significant adverse effects to the users of the junction of B6262 and Moor Lane and a minor road south of High Moss Woodland, and a footpath near Center Parcs in year one of operation.
- No significant effects expected by year 15 of operation.

Temple Sowerby to Appleby

- There are likely significant adverse effects to the LCAs of Intermediate Farmland and Broad Valleys, to users of PRow in the vicinity and a

number of properties and open space around Kirkby Thore in year one of operation.

- By year 15 of operation, it is likely there will be remaining significant adverse effects on three PRow and road users along Priest Lane.

Appleby to Brough

- There are likely significant adverse effects to the LCAs of Intermediate Foothills and Broad Valleys and to users of PRow in the vicinity in year one of operation.
- By year 15 of operation, it is likely there will be remaining significant adverse effects to users of the Warcop Railway Station.

Bowes Bypass

- There are likely significant adverse effects to users of the Street and to users of PRow in the vicinity in year one of operation.
- By year 15 of operation, it is likely there will be remaining significant adverse effects to users of one PRow and road users of The Street.

Cross Lanes to Rokeby

- There are likely significant adverse effects to the Broad Character Area of Barningham, Brignall and Rokeby and users of PRow in the vicinity in year one of operation.
- By year 15 of operation, it is likely there will be remaining significant adverse effects to users of three public rights of way, as well as users of Rokeby Park, the Church of St Mary.

Stephen Bank to Carkin Moor

- There are likely significant adverse effects to the Local Landscape Character Areas of East and West Layton Fringe and West Layton, users of Mainsgill Farm and users of PRow in the vicinity in year one of operation.
- By year 15 of operation, it is likely there will be remaining significant adverse effects to users of two PRow, motorists and pedestrians on Colliers Lane and visitors to Mainsgill Farm.

A1(M) Junction 53 Scotch Corner

- There are no significant effects likely in year one of operation and no significant effects likely in year 15.

4.9 Material Assets and Waste

Baseline

- 4.9.1 Material assets used during construction of the Project will include primary raw materials, such as aggregates and minerals, and manufactured construction products including, among other things, recycled and secondary aggregates.
- 4.9.2 There are mineral safeguarding sites (operational sites or sites identified within strategic planning documents for the extraction of minerals) such as MSAs located in every scheme across the Project.

- 4.9.3 Consultation with Cumbria County Council, Durham County Council and North Yorkshire County Council identifies there are no existing or future peat resources sites (commercial peat extraction) affected.
- 4.9.4 The Project will generate waste arising from construction, demolition, and excavation (C,D&E) activities. This will cause an increase in demand on the existing waste infrastructure. However, this assessment concludes that there is sufficient infrastructure within the region to avoid a significant effect.
- 4.9.5 With regard to re-use of materials, the baseline target for recycling of construction and demolition waste is 70%, as set out in the EU Waste Framework Directive and the Waste Management Plan for England. The project will exceed this target as DMRB LA 110 identifies the Project will aim to achieve at least 90% recovery of non-hazardous construction and demolition waste. In addition, the Project will set a target of a minimum 31% recycled content as substitutes for primary aggregates.

Construction

- 4.9.6 There are mineral safeguarding sites including MSAs across the Project. The majority of these incursions are very minor and are not likely to lead to sterilisation of the mineral resource. However, the exception to this is the Carboniferous Limestone MSA that extends along the length of the Cross Lanes to Rokeby scheme and will be encroached by the scheme itself. This presents a risk of localised sterilisation and is considered a significant effect.
- 4.9.7 Material assets used during construction include primary raw materials, such as aggregates and minerals, and manufactured construction products which include, among other things, recycled and secondary aggregates. Most of the material resources required for construction of the Project, such as metals, aggregate, pavement, concrete and soils, will originate offsite. Some, such as excavated soils, will originate onsite. The Project will seek to utilise as much soil sourced from within study area as possible.
- 4.9.8 The importation of secondary aggregates with low recycled content (below 31%) has been assessed in the ES following the requirements of DMRB LA 110. The Principal Contractor will be provided with a clear target by National Highways from the onset of the Project requiring that at least 31% of aggregates with re-used/recycled content imported onsite and not generate a likely significant effect. This has been set out in the EMP.
- 4.9.9 Opportunities to re-use material resources will be sought where practicable and waste will be minimised and designed out ultimately to prevent and reduce waste sent to landfill. The main type of materials generated during construction and includes concrete, bricks, plastics, metals, plasterboard, timber, made ground, soil and sub-soils, asphalt and bituminous products. Demolition waste is likely to consist of hard and inert materials, soils, rock and stones, wood (including vegetation), brick, concrete, and miscellaneous metals.

- 4.9.10 It is estimated that 1,507,883 tonnes of waste will be produced from CD&E. Of the total waste produced, approximately 90% (tonnes) of this waste diverted from landfill via re-use, recycling and recovery.
- 4.9.11 Based on preliminary data, the recycling and recovery of Construction Demolition Waste across the Project will not generate a likely significant effect (more than 70%).
- 4.9.12 The estimated quantity of CD&E waste generated from the Project which may potentially be sent for disposal to inert, non-hazardous and hazardous landfills, in construction period does not represent a likely significant effect. It has been concluded that there is no requirement for disposal outside of the region.

Operation

- 4.9.13 Material use and waste generation during operation will be restricted to routine maintenance of the road and are deemed to be minor, with no significant effects expected.

Summary

- 4.9.14 Summary of **construction** assessment:
- There is potential for a significant effect due to the risk of substantially constraining or preventing potential future extraction of materials within a mineral safeguarding site at the Cross Lanes to Rokeby scheme.
 - There will be no likely significant effects on the future inert, non-hazardous and hazardous landfill capacity in the Northeast, the Northwest and Yorkshire and The Humber.
 - There will be no likely significant effects related to materials used within the Project or waste during construction or operation.
- 4.9.15 Summary of **operational** assessment:
- There are no significant effects likely during operation on materials and waste.

4.10 Noise and vibration

Baseline

- 4.10.1 The area surrounding the Project is predominantly rural in nature but is in close proximity to Penrith, Temple Sowerby, Kirkby Thore, Crackenthorpe, Appleby, Warcop, Brough, Bowes, West Layton, East Layton, Scotch Corner and Middleton Tyas. There are other communities located more distant from the Project which are impacted either beneficially or adversely, by the changes in traffic movements as a result of the operation of the Project. These include Barnard Castle, Richmond and Ravensworth. All settlements have associated residential and non-residential receptors which are sensitive to noise. The non-residential receptors include offices, scheduled monuments, places of worship, PRow, community facilities and schools.

4.10.2 Road traffic along the A66 route corridor accounts for the majority of noise generated in the area. The high existing noise levels adjacent to the A66 corridor are reflected in the designation of 11 'Noise Important Areas' (NIA) - areas identified by the government as being most exposed to noise - in the vicinity of the road. Additional sources of noise which contribute to the overall noise climate include aircraft, farm vehicles, industrial noise and occasional trains passing by from the Settle-Carlisle and Appleby-Langwathby railway lines. There is also a military firing range and training facility at Warcop.

Construction

- 4.10.3 During construction, the Project has the potential to cause likely significant temporary noise and vibration impacts on the closest receptors to the development. The potential for temporary construction noise and vibration impacts is dependent on the construction activities being undertaken. Construction and vibration impacts have been assessed as significant effects when construction is at its busiest and closest to receptors.
- 4.10.4 The EMP includes a Noise and Vibration Management Plan (NVMP). The NVMP includes measures to manage and reduce noise and vibration impacts, including implementation of Best Practicable Means (BPM) and consultation with Local Authorities. BPM includes the selection of quiet and low vibration equipment, optimal location of equipment on site to minimise noise disturbance, the use of enclosures for stationary equipment, no start-up or shut down of vibratory equipment within 50 metres of close receptors, and the use of less intrusive vehicle reversing warnings. Consultation with relevant local authority will be undertaken prior to any construction works being initiated.
- 4.10.5 The potential for temporary construction traffic impacts on sensitive receptors along existing roads used by construction vehicles is dependent on the volume and route of construction traffic and the amount of other traffic using the route.
- 4.10.6 Diversion routes, when construction works on the A66 take place, have the potential to give rise to adverse impacts upon receptors in close proximity to such routes. These diversion routes are only likely to be required for limited activities and unlikely to be for significant durations. There is likely to be temporary significant effects to any receptor within 25 metres of a diversion route. At this stage diversion routes are yet to be confirmed. The selection of diversion routes will be conducted in line with the EMP and respective NVMP and Construction Traffic Management Plan. For this assessment, as a worst-case scenario, the assessment of diversion routes is undertaken on indicative potential routes within and around the Project.

Operation

4.10.7 Effects of vibration is scoped out of operational assessment as modern road standards and modern tyres result in very low levels of vibration in operation. Once operational, changes in the noise climate will arise from physical changes to the road layout and changes in the traffic volume using the Project's nearby road network. Changes in noise levels will be

dependent on a range of factors including traffic flow, percentage of HGVs, speed, road surface, ground topography, the presence of intervening buildings and structures and distance from the road.

- 4.10.8 The operation of the Project is predicted to give rise to beneficial effects at 408 residential and 46 non-residential receptors where the existing A66 is by-passed and where the traffic volume on the by-passed roads decreases. There are three NIAs predicted to be subject to significant beneficial effects. Conversely, there are 128 residential and 6 non-residential receptors which are predicted to experience significant adverse effects as a result of noise increase arising from the Project. There is potential for four additional significant adverse effects should the final alignment within the detailed design move closer to residential properties (within the Limits of Deviation set out within the DCO submission).
- 4.10.9 Noise reduction measures have been embedded within the Project such as the selection of the vertical and horizontal alignment and the use of road surfacing (where appropriate) with lower noise generating characteristics than standard hot rolled asphalt road surfacing. Noise barriers in the form of earth bunds have been implemented, as far as it is practicable, to minimise any adverse impacts arising from noise emissions. Additional noise barriers have been proposed, where sustainable, in locations where change in noise levels is expected to be significant in order to lessen impacts. These will be committed to subject to consultation with relevant stakeholders and residents given their highly localised benefits.

Summary

4.10.10 Summary of the **construction** assessment:

M6 Junction 40 to Kemplay Bank

- Significant temporary adverse effects to up to 196 residential and non-residential receptors at Penrith, Eamont Bridge and Redhill throughout the construction phase.

Penrith to Temple Sowerby

- Significant temporary adverse effects to up to 15 residential and non-residential receptors at Brougham and Temple Sowerby throughout the construction phase.

Temple Sowerby to Appleby

- Significant temporary adverse effects to up to 68 residential and non-residential receptors at Kirkby Thore, Long Marton, Crackenthorpe, Temple Sowerby, Colby and Appleby-in-Westmorland throughout the construction phase.

Appleby to Brough

- Significant temporary adverse effects to up to 21 residential and non-residential receptors at Brough, Warcop, Sandford and Coupland Beck, throughout the construction phase.

Bowes Bypass

- Significant temporary adverse effects to up to 10 residential and non-residential receptors at Bowes, Boldron and Gilmonby throughout the construction phase.

Cross Lanes to Rokeby

- Significant temporary adverse effects to up to 11 residential and non-residential receptors at Barnard Castle, Rokeby and Brignall throughout the construction phase.

Stephen Bank to Carkin Moor

- Significant temporary adverse effects to up to five residential and non-residential receptors at East Layton, West Layton and Ravensworth, throughout the construction phase.

A1(M) Junction 53

- Significant temporary adverse effects to up to two residential and non-residential receptors at Middleton Tyas, throughout the construction phase.

4.10.11 Summary of **operational** assessment:

M6 Junction 40 to Kemplay Bank

- There is one dwelling located to the south of Kemplay Bank roundabout predicted to experience a significant permanent beneficial effect.
- One dwelling to the west of Skirsgill Business Park is expected to experience a significant permanent adverse effect. With the implementation of a noise barrier, the effect is likely to be eliminated. Provision of such barrier is subject to consultation with relevant stakeholders.
- There are three commercial receptors located east of the Kemplay Bank roundabout predicted to experience significant permanent beneficial effects.
- One commercial property to the north of Skirsgill roundabout is expected to experience a significant permanent adverse effect.

Penrith to Temple Sowerby

- Four dwellings are expected to experience a significant permanent beneficial effect. One receptor is located near Whinfell (north of the existing A66) and three receptors are located off Moor Lane (Fremington).
- Four dwellings are expected to experience a significant permanent adverse effect. The receptors are located near Whinfell Park and alongside Moor Lane.
- Brougham Institute at Whinfell is expected to experience a significant permanent beneficial effect.
- Llama Karma Kafé at Lords House is expected to experience a significant permanent adverse effect. National Highways has acquired this building and temporarily repurposed it as National Highways offices. The office has not been considered as a sensitive receptor, for construction or operation, as it is part of the Project infrastructure

Temple Sowerby to Appleby

- 280 dwellings within Kirkby Thore, near or within Crackenthorpe, near to Long Marton Road and along the existing A66 are expected to experience a significant permanent beneficial effect. One NIA is also predicted to experience a significant permanent beneficial effect.
- 67 dwellings within Kirkby Thore at Sandersons Croft, Spitals Farm, Halefield, Sleastonhow, Powis House, Castrigg Hill and Roger Head are expected to experience a significant permanent adverse effect.
- 12 non-residential receptors, including Kirkby Thore primary school, are expected to experience a significant permanent beneficial effect.
- One non-residential property at Spitals is expected to experience a significant permanent adverse effect.

Appleby to Brough

- Five dwellings near Turks Head and Wheatsheaf Cottage are expected to experience a significant permanent beneficial effect. One NIA is also predicted to experience a significant permanent beneficial effect.
- 17 dwellings, located near West View, Foxtower View and within Warcop are expected to experience a significant permanent adverse effect.
- One non-residential receptor is predicted to experience a significant permanent adverse effect. The receptor is a hotel in Apple Tree Farm.
- Two receptors are at risk of significant permanent adverse effects should the final alignment within the detailed design move closer to residential properties (within the Limits of Deviation set out within the DCO submission).

Bowes Bypass

- One dwelling at Stone Bridge farm is expected to experience a significant permanent adverse effect.
- One non-residential receptor on the western outskirts of Bowes is expected to experience a significant permanent adverse effect.
- Two receptors are at risk of significant permanent adverse effects should the final alignment within the detailed design move closer to residential properties (within the Limits of Deviation set out within the DCO submission).

Cross Lanes to Rokeby

- One residential receptor is predicted to experience a significant permanent beneficial effect in the School House at Rokeby.
- 10 dwellings located along the existing A66 in the North Bitts Farm, near to Tutta Beck, Birk Head, Cross Lanes and Rokeby are expected to experience a significant permanent adverse effect. For the receptor at North Bitts Farm, the implementation of a noise barrier is likely to eliminate the significant effect. The provision of the noise barrier is subject to consultation with relevant stakeholder including the resident themselves.
- Two non-residential receptors, the Old School village hall and St Mary's Church in Rokeby, are expected to experience a significant permanent beneficial effect.

- One non-residential receptor, Cross Lanes Organic Farm Shop, is expected to experience a significant permanent adverse effect.

Stephen Bank to Carkin Moor

- Eight dwellings, located at Ravensworth Lodge, Foxwell, Foxgrove Farm and Foxhall are expected to experience a significant permanent beneficial effect. One NIA is also predicted to experience a significant permanent beneficial effect.
- 12 dwellings located near to West Layton and Carkin Moor Farm are expected to experience a significant permanent adverse effect.

A1(M) Junction 53 Scotch Corner

- No significant effects have been identified at the receptors nearby the A1(M) Junction 53 Scotch Corner scheme.

Routewide

- There are 109 receptors located in-between schemes or close to roads predicted to experience a significant permanent beneficial effect as a result of the operation of the Project. These receptors are located around Cliburn and Bolton (alongside Wetheriggs and Chapel Street to the south-east of Penrith), Barnard Castle (alongside A67 and Newgate), Ravensworth (alongside Waitlands Lane and Stonygate Bank) and Richmond (alongside Gallowgate)
- 28 non-residential receptors are predicted to experience a significant permanent beneficial effect as a result of the operation of the Project. These receptors are located in Barnard Castle and Richmond.

4.11 Population and Human Health

Baseline

- 4.11.1 The area surrounding the Project varies from the urban settlement of Penrith at the western extents of the Project, to being predominately rural in nature with vast areas of agricultural land and rural communities of Temple Sowerby, Kirkby Thore, Warcop, Bowes, Cross Lanes, Rokeby, Stephen Bank and Carkin Moor. There are multiple residential, community and business receptors within these areas, particularly within Kirkby Thore.
- 4.11.2 Penrith, at the western end of the Project is the main location for residential, community and business receptors along the length of the Project. Key receptors include Center Parcs, British Gypsum, Cumbria Constabulary Police Headquarters, North West Ambulance Station, Helbeck Quarry, Hulands Quarry and the Ministry of Defence Training Establishment at Warcop.
- 4.11.3 Outside of the main residential areas, the main land use is agriculture and there are numerous agricultural holdings located within the countryside surrounding the Project.
- 4.11.4 There is an extensive PRow network (including bridleways, footpaths, National Cycle Network within the vicinity of the Project. These routes serve a wide range of users, including horse-riders, pedestrians and

cyclists providing connectivity between key communities and the North Pennines AONB.

- 4.11.5 The health and well-being of the local communities that will be impacted by the Project have been considered within the assessment.

Construction

- 4.11.6 Based on the Project design and associated construction activities, the Project has the potential to impact upon population and human health receptors.
- 4.11.7 During construction, there will be impacts on residential, commercial and community receptors due to the demolition of properties, temporary land take and access restrictions.
- 4.11.8 Walkers, cyclists and horse-riders will potentially be impacted by temporary land take, closure or diversion of walking/cycling routes and bridleways.
- 4.11.9 Agricultural land holdings will largely be impacted as a result of temporary land take required for the Project.
- 4.11.10 Without mitigation, the health and well-being of the local population may potentially be impacted by environmental factors such as noise, dust, visual and lighting and the presence of construction traffic, including HGVs. Accessibility to key facilities and services (including healthcare) may be impacted due to the presence of construction activities.
- 4.11.11 The Project has been designed to minimise disruption to property and land take where possible. Mitigation measures during construction will include temporary diversions and signage to limit the impacts of any temporary closures of Walking, Cycling and Horse-riding (WCH) routes. Access to residential, commercial and community receptors will be maintained where possible. Plans will be developed to help manage impacts, including Public Rights of Way Management Plan, Skills and Employment Strategy and management processes included in the EMP. These will be based on the outline plans in EMP Annex B6 and Annex B12.
- 4.11.12 Specific scheme impacts are set out below:
- There is expected to be a permanent impact to the Happy Hooves Riding Centre as a result of land take required for the construction phase of the scheme.
 - Requirement for land within the Skirsgill Depot employment allocation for use as a construction compound would delay any development however the land will be reinstated to its existing condition to allow for future development upon completion of the construction phase.
 - There will be adverse impacts to multiple community receptors and open spaces during construction due to a decline in amenity value or accessibility as a result of the construction phase, including Skirsgill Park and Wetheriggs Country Park.
 - Lightwater Cottages, High Barnes Cottages, Dunelm House, Winthorn House and Low Broats will require demolition in order to construct the scheme.

- Foxgloves, Barn Owl Cottage, Monks Rest Farm and the Llama Karma Kafé and Llamas Pyjamas businesses will be acquired to facilitate the construction of the scheme.
- There is the potential for accessibility issues to Center Parcs during the construction period, particularly during holiday seasons, and effects on British Gypsum, Barn End Caravan Park, Helbeck Quarry, Carkin Moor Quarry and Mainsgill Farm Shop due to traffic management.
- Part of the playing field of Kirkby Thore Primary School is required temporarily for the diversion of an overhead power line.
- Twelve community sites are at risk of impacts from dust, noise, and landscape changes through the construction phase.
- Mains House and Croft Cottage located on the access road to West View will be subject to some landtake in order to construct the scheme, though neither property is expected to be demolished.
- Bowes Moor Common Land will be subject to landtake through the construction phase.
- There is potential for temporary impact to the accessibility of Bowes Hutchinson Church of England Nursery and Bowes Hutchinson Church of England Primary School.
- Ivy Hall Farm and Campsite will be subject to landtake which may affect their business operation both temporarily and permanently and Cross Lane Organic Farm Shop will lose some parking provision.
- There will be a requirement to permanently divert National Cycle Network 70 Pennine Way. The route will be diverted to the south of the Order Limits, along The Street towards Bowes and then north along the A67, reconnecting to Clint Lane.
- 49 agricultural land holdings will be impacted during construction across the Project.
- The human health impact has been assessed as overall negative during construction.

Operation

4.11.13 During operation, the Project is expected to bring beneficial impacts to population and human health receptors.

- For residential, commercial and community receptors, it is likely that the Project will result in beneficial impacts due to enhanced accessibility and a general reduction in congestion across the A66 and associated local road network. Benefits for WCH will include a reduction in severance and an improvement in connectivity and local travel patterns through the provision of new walking and cycling routes.
- It is expected that in operation, there will be a beneficial effect on the tourism sector within the Lake District National Park and the North Pennines AONB given improved accessibility through the area.
- Improved travel through the area is expected to have beneficial effects on 24 community assets including Penrith Community Hospital and Cumbria Blue Light Services, and to areas of employment.
- There will be beneficial noise and vibration impacts for the Cumbria Blue Light Services located to the south of the existing A66.

- There will be a permanent improvement to the accessibility to Center Parcs from the new junction.
- Seventeen community sites are expected to benefit from improved connectivity.
- As a result of likely changes to noise levels, there is an expected beneficial effect to St Michael's Church, Methodist Church, play area on Main Street, Kirkby Thore primary school and Memorial Hall, Bridge End Pub, Dunkeld Cottage, Somerset House and Foresters Hall.
- The British Gypsum facility is likely to experience a beneficial effect as a result of improved connectivity and access.
- In operation, it is expected that access to Helbeck Quarry will be improved, however there may be adverse noise impacts to Elm Cottage and Flitholme Cottage.
- In operation, it is expected that there will be beneficial effects to Bowes Moor common land, Bowes Hutchinson Church of England nursery and Bowes Hutchinson Church of England Primary School through improved connectivity and access.
- Access into and out of Hulands Quarry, Carkin Moor Quarry and Mainsgill Farm Shop will be improved and made safer resulting in a beneficial effect.
- 49 agricultural land holdings may be affected in operation by changes to noise and air quality through changes to traffic flows affecting farming operations.
- The human health impact has been assessed as overall positive in operation as a result of improved connectivity, improved access to health facilities, creation of improved public right of way network to encourage active travel and improved safety by removal of right turns across live traffic carriageways.

Summary

4.11.14 Summary of the **construction** phase:

M6 Junction 40 to Kemplay Bank

- Significant permanent adverse effect to one community asset.
- Significant temporary adverse effects to four community assets and one business as a result of construction related dust, landscape changes, and noise and vibration.
- Significant permanent adverse effects on three agricultural land holdings – Coach House, Whinfell Park and Leeming.
- No significant effects to private property or PRow are likely.
- Overall negative health effect.

Penrith to Temple Sowerby

- Significant permanent adverse effect to four private properties in the construction phase.
- Significant permanent adverse effects to one business.
- Significant temporary adverse effects to one business as a result of construction related dust, landscape changes, and noise and vibration.

- Significant permanent adverse effects on two agricultural land holdings – Winderwarth Estate and Brougham Castle Farm.
- No significant effects to community assets or PRoW are likely during construction.
- Overall negative health effect.

Temple Sowerby to Appleby

- Significant permanent adverse effect to two private properties in the construction phase.
- Significant temporary adverse effects to six community assets and one business as a result of construction related dust, landscape changes, temporary landtake, and noise and vibration.
- Significant permanent adverse effects on 12 agricultural land holdings – Spitals, West View, Low Moor Caravan Park, Crossfell House Farm, Roman Vale, Street House, Fremington, Rogerhead, West View Farm, Far Boorm Lodge, Redlands Bank and Nicholson.
- No significant effects to PRoW are likely.
- Overall negative health effect.

Appleby to Brough

- Significant permanent adverse effect to two private properties in the construction phase.
- Significant temporary adverse effects to eight community assets as a result of construction related dust, landscape changes, and noise and vibration.
- Significant temporary adverse effects to two businesses as a result of construction related dust, landscape changes, temporary landtake, and noise and vibration.
- Significant permanent adverse effects on six agricultural land holdings – High Green Farm, Low Bank End, Coupland Beck Farm, Wheatsheaf Farm, Roseleigh and Wilson.
- No significant effects to community assets or PRoW are likely.
- Overall neutral health effect.

Bowes Bypass

- Significant permanent adverse effect to one private property in the construction phase.
- Significant temporary adverse effects to three community assets as a result of construction related dust, landscape changes, and noise and vibration.
- Significant permanent adverse effects to one business are expected in the construction phase.
- Significant temporary adverse effects to one business as a result of construction related dust, landscape changes, and noise and vibration.
- Significant permanent adverse effects on 11 agricultural land holdings – The Old Armoury, Old Police House, West End Farm, Black Lodge Farm, Bowes Cross Farm, Middle Lowfield, Streatlam Grove Farm, Lyndale House, High Broats, 2 Low Row and Myre Keld Farm.

- Significant permanent adverse effect to National Cycle Route 70 Pennine Way.
- Overall negative health effect.

Cross Lanes to Rokeby

- Significant permanent adverse effects to one business are expected in the construction phase.
- Significant permanent adverse effects on seven agricultural land holdings – Trees House Farm, Timplon Hill Farm, Moss, Mortham Estate, Thorsgill, Tutta Beck and Harrison.
- No significant effects to private property, community assets or PRoW are likely.
- Overall neutral health effect.

Stephen Bank to Carkin Moor

- Significant permanent adverse effect to one private property in the construction phase.
- Significant temporary adverse effects to two businesses as a result of disruption to access.
- Significant permanent adverse effects on three agricultural land holdings – Browson Bank, Pond Dale and East Layton Hall.
- No significant effects to community assets or PRoW are likely.
- Overall neutral health effect.

A1(M) Junction 53 Scotch Corner

- No significant effects to private property, community assets, businesses or PRoW are likely.
- Overall neutral health effect.

4.11.15 Summary of the **operational** assessment:

M6 Junction 40 to Kemplay Bank

- Significant permanent beneficial effects to 24 community assets and to the tourism sector of the Lake District in the operational phase.
- Significant permanent beneficial effect to one community asset as a result of permanent noise and vibration changes.
- No significant effects to private property, businesses or PRoW are likely.
- Overall neutral health effect.

Penrith to Temple Sowerby

- Significant permanent beneficial effect to one business in the operational phase.
- No significant effects to private property, community assets or PRoW are likely.
- Overall positive health effect.

Temple Sowerby to Appleby

- Significant permanent beneficial effects to fourteen community assets in the operational phase as a result of improved accessibility and/or permanent noise and vibration changes.

- Significant permanent beneficial effect to one business in the operational phase
- No significant effects to private property or PRoW are likely.
- Overall neutral health effect.

Appleby to Brough

- Significant permanent beneficial effects to 12 community assets in the operational phase.
- Significant permanent adverse effects to three businesses as a result of permanent noise and vibration changes.
- Significant beneficial effect to one business in the operational phase.
- No significant effects to private property or PRoW are likely.
- Overall positive health effect.

Bowes Bypass

- Significant permanent beneficial effects to three community assets in the operational phase.
- Significant beneficial effect to one business in the operational phase.
- No significant effects to private property or PRoW are likely.
- Overall positive health effect.

Cross Lanes to Rokeby

- No significant effects to private property, community assets, businesses or PRoW are likely.
- Overall positive health effect.

Stephen Bank to Carkin Moor

- Significant permanent beneficial effect to two business in the operational phase.
- No significant effects to private property, community assets or PRoW are likely.
- Overall positive health effect.

A1(M) Junction 53 Scotch Corner

- No significant effects to private property, community assets, business or PRoW are likely.
- Overall neutral health effect.

4.12 Road Drainage and the Water Environment

Baseline

- 4.12.1 The water environment for this assessment is made up of the road drainage system, surface water features such as watercourses, groundwater contained within rock units that underlie the study area and flood risk.
- 4.12.2 The Project crosses between three river basin management catchments. The Eden and Esk to the west of the Pennines and the Tees and Swale Ure Nidd and Ouse Upper to the east.

- 4.12.3 A number of surface watercourses flow through the area surrounding the Project. This includes the River Eamont, River Lowther and Thacka Beck in the western study area, the River Eden, Trout Beck and Lowgill Beck in the central study area and the River Greta and River Tees in the eastern study area. Watercourses such as these are fed by minor tributaries and field drainage. There are two Drinking Water Protected Areas across the study area, in the west the Lowther (Lower) catchment and in the east, the Tees from River Greta to River Skerne catchment.
- 4.12.4 The following designated sites relevant to the water environment are within the study area:
- River Eden SAC
 - The North Pennine Moors SAC
 - The North Pennine Moors SPA
 - River Eden and Tributaries SSSI
 - Temple Sowerby Moss SSSI
 - Bowes Moor SSSI
 - Kilmond Scar SSSI
- 4.12.5 The hydrogeology of the study area comprises superficial deposits (unconsolidated sediments, such as gravel, sand, silt and clay) that overlie older deposits or rocks referred to as bedrock. Quantities of groundwater from these rocks (referred to as aquifers) differ throughout the Project.
- 4.12.6 Sections within the study area are at risk of flooding from rivers or other watercourses and flooding as a result of from rainfall and surface water sources. There is also potential for groundwater flooding from superficial deposits and from unconfined bedrock aquifers.

Construction

- 4.12.7 During construction, before mitigation, there is potential for significant impacts on surface water, groundwater and flood risk receptors. Surface water and groundwater quality may be impacted by increased pollution from mobilised suspended solids and spillages of fuel and other hazardous substances. Construction activities within or within close proximity to surface water features have the potential to impact the movement and distribution of the watercourses as well as their ecological quality.
- 4.12.8 The construction of new crossings, both in the form of open span crossings and culverted channels, have the potential to impact upon the physical character and water content of waterbodies due to temporary dewatering and loss of channel.
- 4.12.9 Groundwater levels and flows may be impacted by cuttings, embankments and the installation of underground structures. Without mitigation, there is potential for significant effects on Flitholme spring at the Appleby to Brough scheme, the springs surrounding Wildboar Hill at the Temple Sowerby to Appleby scheme and the springs which are located at the western end of the Bowes Bypass scheme.
- 4.12.10 Changes to impermeable area may result in increased flood risk.
- 4.12.11 Mitigation measures to protect the water environment will include:

- Changes to crossing points at detailed design will be designed and installed following consultation with appropriate hydromorphology and geomorphology experts, and with the Environment Agency and Natural England as appropriate.
- Further surveys will be undertaken as part of the detailed design to collect further data on springs and abstractions that are within areas of potential impact.
- Where land drainage from agriculture is encountered during construction, actions will be taken to divert the flow to an appropriate location and prior to completion of the Project, these field drains will be reinstated to the original locations, where practically possible, or diverted to an appropriate discharge location.
- If the Environment Agency Floodline Warnings Direct service is issuing alerts, then temporary flood defences will be required for set-down areas associated with construction and will be agreed with the Environment Agency.

4.12.12 Further construction mitigation is included in the EMP, Ground and Surface Water Management Plan Annex B7 of the EMP. In spite of this, there is still considered a significant risk to Flitholme spring due to the current design, which is considered a significant effect for the purposes of environmental assessment.

Operation

4.12.13 Before mitigation, there is potential for significant effects on surface water, groundwater and flood risk. Surface water and groundwater quality could potentially be impacted by polluted surface water runoff that may migrate or be discharged to surface water features or groundwater via the proposed highway drainage system.

4.12.14 The physical character and water content of surface water features have the potential to be permanently impacted by new watercourse crossings, while new embankments and cuttings may alter catchment drainage patterns, resulting in permanent impacts to catchment hydrology.

4.12.15 The presence of new structures (with associated foundations) and cuttings further have the potential to impact groundwater levels and flows.

4.12.16 The Project will include a road drainage system which has been designed to protect the water environment from highway pollution and to ensure that the Project does not lead to flooding. The drainage design will incorporate treatment of water where feasible, retain the flow of watercourses across the Project and be appropriately sized to allow for surface water runoff and potential ingress of groundwater where there are cuttings.

4.12.17 To maintain the existing water environment, the Project will:

- Install green bank protection measures, such as scour protection to mitigate against the potential to changes of the geometry of the channel.
- Carry out further modelling for realigned sections of channel.
- Carry out the naturalisation of culvert beds with appropriate riverbed substrate.

- Use planting to introduce natural source of woody material to watercourses
- Introduce measures to dissipate flow velocity at culvert outfalls

Summary

4.12.18 Summary of the **construction** assessment:

- Significant permanent adverse effect to Flitholme Spring due to the significant risk posed to it by the current design.
- Results of WFD assessment have concluded that no construction activity will cause deterioration of the WFD status of any waterbody or prevent them from achieving either 'Good Ecological Status' or 'Good Ecological Potential'.

4.12.19 Summary of **operational** assessment

- No significant effects on the water environment are determined during operation with appropriate mitigation in place.

4.13 Cumulative effects

4.13.1 An assessment has been undertaken of potential cumulative effects for all the above environmental topics arising from the following:

- Proposed developments in the vicinity of the Project that are under construction, have been consented or are identified on development plans, combined with the effects of the Project.
- The combined effects from the Project on a single receptor from a number of individual environmental impacts, for example noise, dust, landscape impacts on a single residence.

Cumulative effect with other developments

4.13.2 A review of the planning applications and allocations within the area around the Project was undertaken to identify any other developments which may result in a cumulative effect together with the Project, which is a greater, new or different significant effect than will result from the Project on its own. The search area for these other developments was the largest combined area based on the likely distances from which developments could influence each environmental topic.

4.13.3 An assessment has been undertaken of potential cumulative effects for all the above Cumulative effects have been identified by considering whether:

- There will be any change in magnitude of the significant effects from the Project, as identified within the environmental factor assessments, taking into consideration any impacts from the other developments. For example, a moderate adverse significant effect becoming a large adverse significant effect.; or
- The impacts of the scheme on key receptors potentially affected by 'other developments', in combination with any impacts of the other developments will trigger a significant effect where the impacts of the scheme in isolation will not, i.e. a non-significant effect becoming a significant effect.

Summary of cumulative effects assessment

- It is not likely that any development will result in cumulative effects that will alter significant effects in construction or operation as they are set out in the relevant topic chapter.

Combined effects on a single receptor

4.13.4 Combined impacts are from the action of a number of different impacts upon a single resource or receptor and are considered within the environmental topic chapters of the ES.

4.13.5 Many environmental topics inherently assess receptors on an in-combination basis. For example, to ascertain the impacts to human health, the effects of noise, air quality, severance of PRoW and changes to visual amenity must be factored in. Therefore, many of the potential effects that would be identified through this assessment have already been identified within the topic chapter that is relevant to the receptor. There were no additional effects identified in the review of combined effects on a single receptor.

4.14 Summary of Significant Environmental Effects

4.14.1 Table 4-1: Summary of residual significant environmental effects provides a high-level summary of likely significant effects remaining after mitigation has been implemented, referred to as residual effects. This summary presents significant effects in operation which refers to the completion of the construction and the fully open and operational A66. The exception would be landscape and visual wherein the residual effects in operation are considered to be those that are still present 15 years after opening. Any permanent effect that would occur in construction would also be present in operation and is not repeated across both columns in the table below.

Table 4-1: Summary of residual significant environmental effects

Topic	Construction stage	Operational Stage
Air Quality	No significant effects routewide	No significant effects routewide
Biodiversity	M6 Junction 40 to Kemplay Bank Significant temporary adverse effects on priority habitats	M6 Junction 40 to Kemplay Bank No significant effects in operation
	Penrith to Temple Sowerby Significant temporary adverse effects on priority habitats	Penrith to Temple Sowerby No significant effects in operation
	Temple Sowerby to Appleby Significant temporary adverse effects on priority habitats	Temple Sowerby to Appleby Significant permanent moderate adverse effect on barn owl as a result of new carriageway increasing barn owl mortality in areas known to be used by foraging barn owl
	Appleby to Brough Significant temporary adverse effects on priority habitats	Appleby to Brough No significant effects in operation
	Bowes Bypass Significant temporary adverse effects on priority habitats	Bowes Bypass No significant effects in operation
	Cross Lanes to Rokeby	Cross Lanes to Rokeby

Topic	Construction stage	Operational Stage
	Significant temporary adverse effects on priority habitats	No significant effects in operation
	Stephen Bank to Carkin Moor Significant temporary adverse effects on priority habitats	Stephen Bank to Carkin Moor Significant permanent moderate adverse effect on barn owl as a result of new carriageway increasing barn owl mortality in areas known to be used by foraging barn owl
	A1(M) Junction 53 Scotch Corner Significant temporary adverse effects on priority habitats	A1(M) Junction 53 Scotch Corner No significant effects in operation
Climate	No significant effects routewide	No significant effects routewide
Cultural Heritage	M6 Junction 40 to Kemplay Bank Significant temporary adverse effects upon setting of Grade II* listed Carleton Hall Significant temporary adverse effects upon setting of Grade II Toll Bar Cottage	M6 Junction 40 to Kemplay Bank No additional significant effects in operation
	Penrith to Temple Sowerby Significant temporary adverse effects upon setting of Grade II* listed Countess Pillar Significant temporary adverse effects upon setting of Grade II* listed Alms Table Significant temporary adverse effects upon setting of Grade II listed Milestone East of Whinfell Park Significant permanent adverse effect upon archaeology at Scheduled Monument of Brougham Roman fort (Brocaum) and civil settlement and Brougham Castle Scheduled Monument Significant permanent adverse effect upon archaeology at Ring ditches at Brougham	Penrith to Temple Sowerby Significant permanent beneficial effects upon Scheduled Monument and Grade II* listed Countess Pillar, Grade II* listed Alms Table due to a new amenity parking area and footway access providing better access to the site. Significant permanent beneficial effects the existing car park will be relocated improving accessibility to the scheduled monument of St Ninian's and Grade II listed building the Church of St Ninian.

Topic	Construction stage	Operational Stage
	<p>Significant permanent adverse effect upon archaeology at two peat deposits associated with nearby paleochannels</p>	
	<p>Temple Sowerby to Appleby Significant temporary adverse effects upon setting at Grade II listed Milestone to the north-east of Crackenthorpe Hall Significant temporary adverse effects upon setting at Grade II listed Spital Farmhouse with adjoining Stables Significant temporary adverse effects upon setting at Grade II listed Threshing Barn and Byre to the east of Spital Farmhouse Significant temporary adverse effects upon setting at Grade II listed Coach House, Barns, Byres and Entrance Arch to the north of Spital Farmhouse Significant permanent adverse effect upon archaeology at Enclosure and other features north-west of Kirkby Thore</p>	<p>Temple Sowerby to Appleby No significant effects in operation</p>
	<p>Appleby to Brough Significant temporary adverse effects upon setting at Grade II listed Boundary Stone To North Of Bullistone Cottage Significant permanent adverse effect upon archaeology at Scheduled Monument of Warcop Roman Camp Significant permanent adverse effect upon archaeology at Sandford Moor Barrow group Significant permanent adverse effect upon the roman trackway and associated features, and prehistoric features north of Warcop</p>	<p>Appleby to Brough No significant effects in operation</p>
	<p>Bowes Bypass Significant temporary and permanent adverse effect upon setting at Grade II listed Stone Bridge Farmhouse</p>	<p>Bowes Bypass Significant permanent adverse effect upon Grade II listed Stone Bridge Farmhouse, Grade II</p>

Topic	Construction stage	Operational Stage
	<p>Significant temporary and permanent adverse effect upon setting at Grade II listed Loose boxes, 5 metres east of Stone Bridge Farmhouse</p>	<p>listed Loose boxes, 5 metres east of Stone Bridge Farmhouse, and Grade II listed Farm buildings and gin-gang attached to south of Stonebridge Farmhouse, due to an increase in traffic passing immediately in front of the farmhouse group in addition to that along the main road corridor.</p>
	<p>Significant temporary and permanent adverse effect upon setting at Grade II listed Farm buildings and gin-gang attached to south of Stonebridge Farmhouse</p>	
	<p>Cross Lanes to Rokeby No significant effects in construction</p>	<p>Cross Lanes to Rokeby No significant effects in operation</p>
	<p>Stephen Bank to Carkin Moor Significant permanent adverse effect upon archaeology and setting at Roman Fort and Prehistoric enclosed settlement 400 metres west of Carkin Moor Farm Significant permanent adverse effect upon archaeology at Roman Settlement at Carkin Moor Roman Fort</p>	<p>Stephen Bank to Carkin Moor No significant effects in operation</p>
<p>Geology and soils</p>	<p>Significant permanent adverse effects to Grade 2 and Grade 3a soils (all schemes except A1(M) Junction 53 Scotch Corner)</p>	<p>No significant effects routewide</p>
<p>Landscape & Visual</p>	<p>M6 Junction 40 to Kemplay Bank Significant temporary adverse effects to: Residences along Clifford Road and Skirsgill Lane. Recreational users of Wetheriggs Park, two public rights of way and Mayburgh Henge Motorists and pedestrians using the A6</p>	<p>M6 Junction 40 to Kemplay Bank No significant effects in year 15 of operation</p>
	<p>Penrith to Temple Sowerby Significant temporary adverse effects to:</p>	<p>Penrith to Temple Sowerby No significant effects in year 15 of operation</p>

Topic	Construction stage	Operational Stage
	<p>Landscape Character Areas of Sandstone Ridge and Broad Valleys</p> <p>Residents of Ash Hill Cottages along Cliburn Road</p> <p>Recreational users of two public rights of way in the area and of the junction of the B6262 and Moor Lane near Brougham Castle</p> <p>Motorists and pedestrians of the minor road south of High Moss Woodland leading to the properties of Lane Ends</p>	
	<p>Temple Sowerby to Appleby</p> <p>Significant temporary adverse effects to:</p> <p>Landscape Character Areas of Broad Valleys and Intermediate Farmland</p> <p>Residences at Low Moor Park, Sandersons Croft and Sleastonhow Farm</p> <p>Recreational users of eight public rights of way as well as the Eden Valley Cycle Route</p> <p>Motorists and pedestrians of Long Marton Road, Sleastonhow Lane and Priest Lane</p>	<p>Temple Sowerby to Appleby</p> <p>Significant permanent adverse effects in year 15 of operation to:</p> <p>Recreational users of three public rights of way</p> <p>Motorists and pedestrians of Priest Lane</p>
	<p>Appleby to Brough</p> <p>Significant temporary adverse effects to:</p> <p>Landscape Character Areas of Broad Valleys and Foothills</p> <p>Recreational users of five public rights of way and the Warcop Railway Station</p> <p>Motorists and pedestrians of the minor road leading to Moor House Farm and of the B6259</p>	<p>Appleby to Brough</p> <p>Significant permanent adverse effects in year 15 of operation to recreational users of Warcop Railway Station</p>
	<p>Bowes Bypass</p> <p>Significant temporary adverse effects to:</p>	<p>Bowes Bypass</p> <p>Significant permanent adverse effects in year 15 of operation to:</p>

Topic	Construction stage	Operational Stage
	<p>Broad Character Area of Urban Area Bowes Residences of Bowes Recreational users of three public rights of way, as well as the Pennine Way and Clint Lane Motorists and pedestrians on and adjacent to The Street</p>	<p>Recreational users of one public rights of way Motorists and pedestrians on and adjacent to The Street</p>
	<p>Cross Lanes to Rokeby Significant temporary adverse effects to: Broad Character Area of Barmingham, Briganall and Rokeby Rokeby Historic Park and Garden and associated Church of St Mary Residences in Boldron, Dent House Farm Recreational users of four public rights of way, as well as users of Rokeby Park, the Church of St Mary Motorists and pedestrians of Barnard Castle Road</p>	<p>Cross Lanes to Rokeby Significant permanent adverse effects in year 15 of operation to: Residences in Dent House Farm Recreational users of three public rights of way, as well as users of Rokeby Park, the Church of St Mary</p>
	<p>Stephen Bank to Carkin Moor Significant temporary adverse effects: Local Landscape Character Area of East and West Layton Fringe and West Layton Recreational users of nine public rights of way as well as visitors to Mainsgill Farm Motorists and pedestrians of Colliers Lane</p>	<p>Stephen Bank to Carkin Moor Significant permanent adverse effects in year 15 of operation to: Recreational users of two public rights of way as well as visitors to Mainsgill Farm Motorists and pedestrians of Colliers Lane</p>
	<p>A1(M) Junction 53 Scotch Corner No significant effects anticipated</p>	<p>A1(M) Junction 53 Scotch Corner No significant effects anticipated in year 15 of operation</p>

Topic	Construction stage	Operational Stage
Material Assets and Waste	Significant temporary adverse effect to Carboniferous Limestone mineral safeguarding site in the vicinity of Cross Lanes to Rokeby	No significant effects routewide
Noise and Vibration	Routewide No significant effects during construction.	Routewide Significant permanent beneficial effects to 109 residential receptors located around Cliburn and Bolton, Barnard Castle, Ravensworth and Richmond as well as properties close to section of the A66 between schemes. Significant permanent beneficial effects to 28 non-residential receptors located in Barnard Castle and Richmond.
	M6 Junction 40 to Kemplay Bank Significant temporary adverse effects upon receptors in Penrith, Eamont Bridge, Redhill	M6 Junction 40 to Kemplay Bank Significant permanent beneficial effects to one residential receptor south of Kemplay Bank Roundabout and three commercial receptors located east of Kemplay Bank roundabout. Significant permanent adverse effects to one residential receptor west of Skirsgill Business Park and one commercial property to the north of Skirsgill roundabout
	Penrith to Temple Sowerby Significant temporary adverse effects upon receptors at Brougham, Temple Sowerby	Penrith to Temple Sowerby Significant permanent beneficial effects to four residential receptors: one near Whinfell (north of the A66) and three receptors located off Moor Lane (Fremington) and to the Brougham Institute at Whinfell.

Topic	Construction stage	Operational Stage
		<p>Significant permanent adverse effects to four residential receptors located near Whinfell Park and alongside Moor Lane and to the commercial receptor of Llama Karma Kafé</p>
	<p>Temple Sowerby to Appleby Significant temporary adverse effects upon receptors at Kirkby Thore, Long Marton, Crackenthorpe, Temple Sowerby, Colby, Appleby-In-Westmorland</p>	<p>Temple Sowerby to Appleby Significant permanent beneficial effects to 280 residential receptors within Kirkby Thore, Crackenthorpe, near Long Marton Road and along the existing A66, one Noise Important Area and 12 community assets including Kirkby Thore primary school. Significant permanent adverse effects to 67 residential receptors within Sandersons Croft, Spitals Farm, Halefield, Sleastonhow, Powis House, Castrigg Hill and Roger Head and one non-residential receptor at Spitals.</p>
	<p>Appleby to Brough Significant temporary adverse effects upon receptors at Brough, Warcop, Sandford, Coupland Beck</p>	<p>Appleby to Brough Significant permanent beneficial effects to five residential receptors at Turks Head and Wheatsheaf Cottage and one Noise Important Area. Significant permanent adverse effects to up to 19 residential receptors within West View, Foxtower View and Warcop and one commercial receptor of Apple Tree Farm.</p>

Topic	Construction stage	Operational Stage
	<p>Bowes Bypass Significant temporary adverse effects upon receptors at Bowes, Boldron, Gilmonby</p>	<p>Bowes Bypass Significant permanent adverse effects to one residence at Stone Bridge Farm and up to three non-residential receptor on the western outskirts of Bowes.</p>
	<p>Cross Lanes to Rokeby Significant temporary adverse effects upon receptors at Barnard Castle, Rokeby, Brignall</p>	<p>Cross Lanes to Rokeby Significant permanent beneficial effects to one residential receptor the School House in Rokeby and two non-residential receptors: the Old School village hall and St Mary's Church in Rokeby. Significant permanent adverse effects to 10 residential receptors within Tutta Beck, Birk Head, Cross Lanes and Rokeby and one commercial receptor of Cross Lanes Organic Farm Shop.</p>
	<p>Stephen Bank to Carkin Moor Significant temporary adverse effects upon receptors at East Layton, Ravensworth, West Layton</p>	<p>Stephen Bank to Carkin Moor Significant permanent beneficial effects to eight residential receptors located at Ravensworth Lodge, Foxwell, Foxgrove Farm and Foxhall and one Noise Important Area Significant permanent adverse effects to 12 residential West Layton and Carkin Moor.</p>
	<p>A1(M) Junction 53 Scotch Corner Significant temporary adverse effects upon receptors at Middleton Tyas, Scotch Corner</p>	<p>A1(M) Junction 53 Scotch Corner No significant effects in operation</p>
	<p>M6 Junction 40 to Kemplay Bank</p>	<p>M6 Junction 40 to Kemplay Bank</p>

Topic	Construction stage	Operational Stage
Population & Human Health	<p>Significant temporary adverse effects to local community, businesses and community assets.</p> <p>Significant adverse permanent effects to one community asset</p> <p>Significant adverse permanent effects to three agricultural land holdings</p>	<p>Significant permanent beneficial effects to 24 community assets and to the tourism sector of the Lake District.</p> <p>Significant permanent beneficial effect to one community asset as a result of permanent noise and vibration changes.</p>
	<p>Penrith to Temple Sowerby</p> <p>Significant permanent adverse effect to four private properties</p> <p>Significant permanent adverse effects to one business</p> <p>Significant temporary adverse effects to one business as a result of construction related dust, landscape changes, and noise and vibration</p> <p>Significant permanent adverse effects on two agricultural land holdings</p>	<p>Penrith to Temple Sowerby</p> <p>Significant permanent beneficial effect to one community asset as a result of permanent noise and vibration changes.</p> <p>Significant permanent beneficial effect to one business in the operational phase.</p>
	<p>Temple Sowerby to Appleby</p> <p>Significant permanent adverse effect to two private properties</p> <p>Significant temporary adverse effects to six community assets and one business as a result of construction related dust, landscape changes, temporary landtake, and noise and vibration</p> <p>Significant permanent adverse effects on 12 agricultural land holdings</p>	<p>Temple Sowerby to Appleby</p> <p>Significant permanent beneficial effects to fourteen community assets and one business as a result of permanent noise and vibration changes and/or improved accessibility</p> <p>Significant permanent beneficial effect to one business</p>
	<p>Appleby to Brough</p> <p>Significant permanent adverse effect to two private properties</p>	<p>Appleby to Brough</p> <p>Significant permanent beneficial effects to 12 community assets</p>

Topic	Construction stage	Operational Stage
	<p>Significant temporary adverse effects to eight community assets as a result of construction related dust, landscape changes, and noise and vibration.</p> <p>Significant temporary adverse effects to two businesses as a result of construction related dust, landscape changes, and noise and vibration</p> <p>Significant permanent adverse effects on six agricultural land holdings</p>	<p>Significant permanent adverse effects to one businesses as a result of permanent noise and vibration changes.</p> <p>Significant permanent beneficial effect to one business in the operational phase.</p>
	<p>Bowes Bypass</p> <p>Significant permanent adverse effect to one private property</p> <p>Significant temporary adverse effects to three community assets as a result of construction related dust, landscape changes, and noise and vibration</p> <p>Significant permanent adverse effects to one business</p> <p>Significant temporary adverse effects to one business as a result of construction related dust, landscape changes, and noise and vibration</p> <p>Significant permanent adverse effects on 11 agricultural land holdings</p> <p>Significant permanent adverse effect to National Cycle Route 70 Pennine Way</p>	<p>Bowes Bypass</p> <p>Significant permanent beneficial effects to three community assets</p> <p>Significant permanent beneficial effect to one business in the operational phase.</p>
	<p>Cross Lanes to Rokeby</p> <p>Significant permanent adverse effects to one business</p> <p>Significant permanent adverse effects on seven agricultural land holdings</p>	<p>Cross Lanes to Rokeby</p> <p>No additional significant effects anticipated</p>
	<p>Stephen Bank to Carkin Moor</p> <p>Significant permanent adverse effect to one private property</p>	<p>Stephen Bank to Carkin Moor</p>

Topic	Construction stage	Operational Stage
	<p>Significant permanent adverse effects on two businesses as a result of disruption to access</p> <p>Significant permanent adverse effects on three agricultural land holdings</p>	<p>Significant permanent beneficial effect to two businesses</p>
	<p>A1(M) Junction 53 Scotch Corner No significant effects anticipated</p>	<p>A1(M) Junction 53 Scotch Corner No significant effects anticipated</p>
Road Drainage and Water Environment	<p>Significant permanent adverse effect to Flitholme Spring</p>	<p>No significant effects routewide</p>
Cumulative Effects	<p>No significant effects</p>	<p>No significant effects</p>