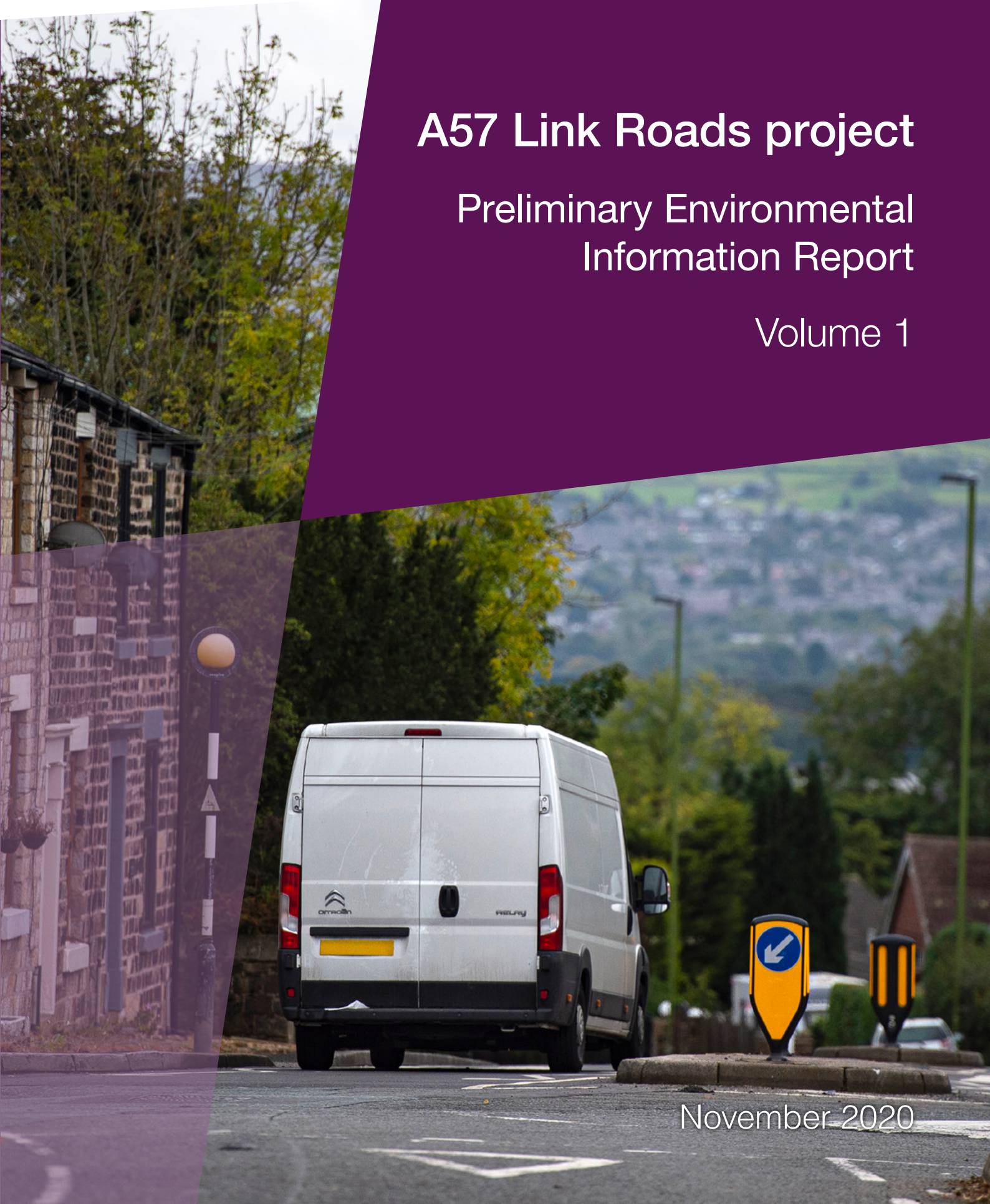
highways england

A57 Link Roads project

Preliminary Environmental Information Report

Volume 1



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Document control

The Project Manager is responsible for production of this document, based on the contributions made by his/her team existing at each Stage

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1 Introduction

1.1 Overview of the project

1.1.1 The main Trans-Pennine route between the Manchester and Sheffield City Regions is the trunk road route consisting of the A57, A628, and A61. It connects the M67 at Mottram in the south east of the Manchester City Region with the M1 in the north west of the Sheffield City Region. Current journey times and reliability of the connecting routes compare unfavourably with links between other cities a similar distance apart.

1.1.2 The Trans-Pennine Upgrade (TPU) is made up of a series of measures announced in March 2015's Road Investment Strategy (RIS), published by the Department for Transport (DfT). The TPU aims is to address longstanding issues of connectivity, congestion, reliability and safety of strategic Trans-Pennine routes between the M67 at Mottram and the M1 J36 and J35A north of Sheffield.

1.1.3 The A57 Link Roads (previously known as Trans Pennine Upgrade) (the Scheme) is part of this wider package of work, shown in Volume 3, Figure 1.1.

1.1.4 The Scheme is located within the administrative boundaries of Tameside Metropolitan Borough Council (Tameside MBC) and High Peak Borough Council. Most of the Scheme is located within Tameside MBC with the immediate eastern end of the Scheme located within High Peak Borough Council. Construction is scheduled to begin by March 2023.

1.1.5 The Preferred Route for the Scheme was announced by Highways England in 2017 and comprises the following elements:

- Mottram Moor Link Road – a new dual carriageway from the M67 Junction 4 roundabout to a new junction on the A57(T) at Mottram Moor
- A57(T) to A57 Link Road – a new single carriageway link from the A57(T) at Mottram Moor to a new junction on the A57 in Woolley Bridge.

1.1.6 In accordance with paragraph 22 of the Highway and Railway (Nationally Significant Infrastructure Project) Order 2013, the Scheme is considered a Nationally Significant Infrastructure Project (NSIP). This is because the Scheme consists of 'construction of a highway wholly in England' (paragraph 22 (1) (a) and (2) a)), 'the Secretary of State will be the highway authority for the highway' (paragraph 22 (2) (b)) and 'the area of development of each scheme (the land on which the highway is to be constructed and any adjoining land expected to be used in connection with its construction) is greater than 7.5ha' (paragraph 22 (2) (c) and (4) (c)).

1.1.7 Highways England is therefore required to apply for a 'Development Consent Order' (DCO). This application will be accompanied by an Environmental Statement (ES) prepared in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (SI No. 572) (hereafter referred to as the 'EIA Regulations') and submitted to the Planning Inspectorate in 2021.

1.2 The consenting process

1.2.1 The legal structure within which the DCO application will be determined is governed by the Planning Act 2008. The Planning Act 2008 required the preparation of new policy to inform decisions made on NSIPs in England and sets out the principles that should be applied in the assessment of DCO applications.

1.2.2 In December 2014, the National Road and Rail Networks: National Policy Statement for National Networks (NN NPS) was published. The NN NPS sets out Government policy for the development of NSIPs on the national road and rail networks in England, providing national planning guidance. The Secretary of State (SoS) will use the NN NPS as the primary basis for making decisions on DCO applications for national networks NSIPs in England.

1.2.3 The DCO consenting route combines a grant of planning permission with a range of other separate consents. In England, the Planning Inspectorate examines DCO applications. Further information on the legislative and policy framework is included in the PEIR Volume 2 Appendix A.

1.3 Purpose of the Preliminary Environmental Information Report (PEIR)

1.3.1 The Planning Inspectorate's Advice Note Seven 'Environmental Impact Assessment: Process, Preliminary Environmental Information and Environmental Statements, Republished December 2017[1]' recommends that Preliminary Environmental Information (PEI) is prepared by the applicant.

1.3.2 Under Provision 12 'Consultation Statement Requirements' of the EIA Regulations, PEI is defined as:

- Information referred to in Regulation 14(2) which has been compiled by the applicant; and,
- Is reasonably required to assess the environmental effects of the development (and of any associated development).

1.3.3 The PEI is documented in a Preliminary Environmental Information Report (PEIR). The purpose of the PEIR is to enable specialist and non-specialist consultees from the community and other stakeholders, to understand the potential pre-mitigation environmental effects of the proposed development. Effects have been predicted for each environmental assessment topic to inform consultee responses at the DCO pre-application consultation stage. The Scheme design is currently being developed and baseline environmental information, such as surveys, are still ongoing.

1.3.4 The PEIR provides a preliminary assessment of the principal environmental issues and may be subject to change as the detailed environmental impact assessment of the Scheme progresses and as the design develops. The PEIR also describes the Scheme at preliminary design stage and its environmental effects, timescales for delivery, alternatives considered, and uncertainties and assumptions.

1.3.5 The final ES will be published as part of the application to the Planning Inspectorate for an order granting Development Consent for the Scheme.

Structure of the PEIR

1.3.6 For each environmental topic, the PEIR:

- Describes the study area environmental baseline data collection work undertaken to date;
- Describes the existing baseline environment, based on the primary and secondary data collection to date;

[1] https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2017/12/Advice-note-7.pdf

- Identifies further work that is ongoing, or that is likely to be undertaken, to complete the Environmental Impact Assessment (EIA);
- Provides an assessment of the likely significant environmental impacts of the Scheme, based on currently available information; and
- Describes the range of mitigation measures that will be considered to avoid, reduce, mitigate or offset the potential environmental impacts.

1.3.7 The PEIR has been divided as follows:

- Volume 1: Main text that includes scheme information, alternatives considered, environmental assessments for each environmental topic, glossary and references;
- Volume 2: Appendices that describe planning legislation and policy, methodology and relevant tables for each environmental topic; and
- Volume 3: Figures that include scheme and outline environmental design drawings and plans to inform each environmental assessment topic chapter in the PEIR Volume 1.

1.3.8 In accordance with the EIA Regulations, the following specialist topics have been included in the scope of assessment:

- Air quality
- Cultural heritage
- Landscape and visual effects
- Biodiversity
- Geology and soils
- Material assets and waste
- Noise and vibration
- Population and human health
- Road drainage and the water environment
- Climate
- Cumulative effects

1.3.9 In addition to the above topics, the EIA Regulations require the potential impact of heat and radiation from a project to be reported. DMRB LA 104 advises that heat and radiation is unlikely to be relevant to the scope of most motorway and all-purpose trunk road projects, and so this topic is scoped out for assessment.

1.3.10 The EIA Regulations also require the consideration of major accidents and disasters in an assessment. Further details of how these major events have been included in the assessment is included in Section 4.10.

1.3.11 Section 4.15 provides more information on how the EIA has been scoped.

1.3.12 For each environmental topic, the following is reported:

- Study area;
- Proposed assessment methodology;
- Existing environmental conditions;
- Other baseline information to be obtained and surveys to be undertaken; and

- Potential effects and mitigation measures.

1.3.13 Owing to the preliminary nature of this assessment, detailed assessment criteria are not reported in each environmental topic assessment chapter. Rather, the environmental topic assessments chapters provide an indication of those effects that are considered likely to occur as a result of the Scheme based on current knowledge of the environment and the Scheme components.

1.3.14 In the final ES, the significance of environmental effects will be assessed using appropriate criteria that reflect current best practice.

1.4 Pre-application consultation programme

1.4.1 Pre-application consultation is an important requirement for DCO applications. It allows for potential issues to be raised, taken into account and, where possible, addressed before the DCO application is submitted for examination.

1.4.2 Under the Planning Act 2008, there are two separate formal stages of pre- application consultation:

- Section 42 with prescribed consultees (e.g. Natural England, Environment Agency, Historic England), local authorities, landowners and others with interests in land; and
- Section 47 consultation with the local community in accordance with the Statement of Community Consultation (SoCC)[2].

1.4.3 For the purposes of this Scheme, both consultation stages will run in parallel.

1.4.4 As part of this consultation process, Highways England will take account of all comments and suggestions received from consultees in relation to the proposed development and the PEIR. Comments will be integrated into further EIA work to be documented in the ES and submitted as part of the DCO application to the Planning Inspectorate.

1.4.5 The DCO application will also include a Consultation Report that will document the outcomes of the consultation and how it has informed the design development of the Scheme.

1.4.6 A significant amount of consultation has already been undertaken for the Scheme, as part of the wider TPU, which is summarised in Table 1-1.

Table 1-1 - Overview of previous consultation

Consultation	Brief description of consultation
Pre-Non-Statutory Consultation on wider TPU October 2015 – March 2017:	Including two option development workshops with key stakeholders; a statutory Environmental Bodies meeting; two public awareness events in Hollingworth and Tankersley; and a letter to potentially affected land interests with follow-up meetings.
Non-Statutory Consultation on wider TPU March 2017 to April 2017:	Including the creation of a 16-page brochure; 8-page feedback questionnaire and a fly-through video; a leaflet drop to 27,500 local residential, commercial and industrial properties; and a series of 5 public exhibition events, in Mottram, Tankersley, Bradbury, Hattersley and Hollingworth.

[2]This sets out how Highways England will consult with the local community on the PEIR, and the Scheme, the consultation programme and methods of communication.

Consultation	Brief description of consultation
Pre-Statutory Consultation on Link Roads April 2017 – February 2018:	Including Statutory Environmental Bodies and Local Authority Steering Group meetings; a preferred route announcement, through press releases, leaflet drops and website posts; a resident's surgery event; and ongoing technical engagement with environmental stakeholders.
Statutory Consultation on Link Roads February 2018 to March 2018:	Including the creation of a dedicated scheme webpage, an A4 brochure, a consultation response form, DCO leaflet and fly through video; copies of the brochure sent to all postal addresses within the consultation zone; a series of six public exhibition events, in Mottram, Glossop, Hattersley, Hollingworth and Tankersley; and consultation documents and an offer of a one to one meeting sent to all land interests.
Post-Statutory Consultation on Link Roads July 2018 onwards	Including ongoing technical engagement with environmental stakeholders; Local Authority Steering Group meetings; and meetings with landowners.

1.4.7 Since the most recent consultation in 2018, Highways England have been working to ensure concerns have been responded to and that the right scheme is delivered for the residents within this area. This has included updating the traffic modelling to better understand how the Scheme will impact traffic on the surrounding road network. The traffic model outputs have also been used to undertake detailed air quality dispersion modelling to predict future air quality once the scheme is operational. This process has allowed the design to be improved with the aim of reducing the environmental impact of the new road; and delivering a quicker, cheaper and greener construction, without compromising on the operational objectives of the scheme. This has resulted in revisions to the Scheme that has been consulted on previously (refer to Section 3.2.4 for details), therefore an additional six-week statutory consultation will run from 5 November – 17 December 2020.

1.4.8 This consultation will ensure that the local community, residents, local interest groups, businesses, visitors and road users have the opportunity to fully understand and comment on the revised proposals.

1.5 Addressing COVID-19 restrictions during consultation

1.5.1 To account for the challenges presented by the coronavirus pandemic, such as social distancing and restrictions on non-essential public gatherings, face-to-face public consultation events cannot proceed as they normally would.

1.5.2 Alternative methods for providing access to Scheme information have been considered, which have been informed by an Equalities Impact Assessment (EqIA) (unpublished). This has accounted for the following factors, some which are unique to the current pandemic, and some which are standard best practice to consider for consultation:

- People who are unable, or choose not to leave the house due to the pandemic;
- Key workers, and those who are not able to work from home during the pandemic;
- People who do not have access to the internet or are less internet literate;
- People who have lower literacy levels;
- People for whom English is not their first language; and

- People who require the consultation materials in an alternative format.

1.5.3 The following mitigation efforts have been developed in order to reduce these concerns as far as possible:

- Posting the consultation brochure and response form to a larger postal area to ensure that local residents who don't have access to the webpage receive a copy;
- Encouraging people to go online to view all of our material, but also offering phone consultation slots to replace face-to-face events, and to support people without internet/computer literacy;
- A flythrough video showing the proposed scheme and explaining the consultation process;
- Acknowledging and addressing feedback during the consultation via telephone and email;
- Sending people hard copies of the consultation materials on request;
- Offering easy read and alternative language versions of the consultation materials on request; and
- Engaging with local equalities officers at Tameside MBC, Derbyshire County Council and High Peak Borough Council throughout the consultation.

1.5.4 Due to the COVID-19 restrictions in place, copies of the brochure or other consultation materials will only be made available at those local deposit points that are permitted to open. However, for individuals who are uncomfortable or unable to get to local deposit points, the public consultation brochure, this PEIR, and other relevant technical documents will be available online at www.highways.gov.uk/trans-pennine-upgrade/

1.5.5 Alternatively, individuals can request post consultation materials. Individual paper copies of the consultation brochure and response form will be supplied free of charge, however there will be a charge for paper copies of the other consultation materials of up to £115 plus P&P. We can provide electronic copies of the consultation materials free of charge via a DVD/USB.

Responding to Consultation

1.5.6 The PEIR will be submitted to the prescribed consultees, local authorities, and landowners and made available to members of the public and the wider community, (in accordance with coronavirus best practice, outlined above).

1.5.7 During the consultation, Highways England will seek comment on:

- The Scheme (including its alignment); and
- Information on the possible environmental effects of the Scheme, as understood at the time and detailed in this PEIR.

1.5.8 Consultees are encouraged to respond to the information contained in this PEIR and the consultation documents. The responses received will be taken into account in preparing the finalised design of the Scheme.

1.5.9 Comments made at all stages of the consultation process will be recorded and carefully considered by the project team. Should other potentially viable options be raised during consultation, their relative merits will be considered and reported on. How feedback has been taken into account will be explained by direct communications, local meetings, media and project updates.

1.5.10 Ultimately, how comments received have shaped and influenced the Scheme will be reported to the Planning Inspectorate in a Consultation Report prepared by Highways England which will accompany the DCO application as required by Section 37(3) (c) of the Planning Act 2008.

2 The Scheme

2.1 Background to the Scheme

2.1.1 The Scheme referred to in this PEIR is part of the wider Trans-Pennine Upgrade (TPU). This section outlines how this programme has developed.

2.1.2 The TPU was announced in March 2015 as part of Road Investment Strategy (RIS), this comprised the following schemes:

- Mottram Moor Link Road - a new dual-carriageway link road from M67 Junction 4 to a new junction at A57(T) Mottram Moor and a new single carriageway connecting to the A6018 Roe Cross Road;
- A57(T) to A57 Link Road – a new single carriageway link from the A57 at Mottram Moor to a new junction on the A57 at Brookfield, bypassing the existing A628/A57 and A57 Woolley Lane/Woolley Bridge Road junctions;
- A628 Climbing Lanes – consideration of the provision of two overtaking lanes on the A628 near Woodhead Bridge;
- Safety and Technology Improvements – safety measures focused on addressing accident hotspots and the provision of electronic signs; and
- Upgrade of the A61 at Tankersley to dual carriageway (referred to as 'A61 Dualling').

2.1.3 Since the RIS was published, the development of 'A628 Climbing Lanes' and 'A61 Dualling' schemes were postponed until a later date, to allow further consideration of the benefits associated with them. If these developments are taken forward at a later date, then the Scheme will be considered within the baseline 'do minimum' scenario for any environmental assessments required to support the design and consenting process.

2.1.4 In November 2017, Highways England published a 'Preferred Route Announcement'. This Preferred Route comprised:

- Mottram Moor Link Road and A57(T) to A57 Link Road (Option A);
- Safety and Technology Improvements; and
- Westwood Roundabout.

2.1.5 The Safety and Technology improvements and Westwood Roundabout were not considered to be NSIPs. Furthermore, following a review of the advice provided in 'Guidance on associated development applications for major infrastructure projects[3]' (DCLG, April 2013), neither were they considered to be associated development. These developments have been included within the baseline 'do minimum' scenario for the Scheme's EIA. It is anticipated that the impacts of these schemes, which will be described in the ES, will be minimal. These elements are already being delivered by Highways England and completing them in advance will aid traffic management during construction of the Scheme.

2.1.6 The specific Scheme referred to within this PEIR therefore only consists of the former Mottram Moor Link Road and A57(T) to A57 Link Road.

[3] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/192681/Planning_Act_2008_-_Guidance_on_associated_development_applications_for_major_infrastructure_projects.pdf

2.2 Scheme objectives

2.2.1 The Scheme objectives are listed below:

- **Connectivity** – by reducing congestion and improving the reliability of people's journeys through Mottram in Longendale, Hollingworth and Tintwistle and also between the Manchester and Sheffield city regions
- **Environmental** – by improving air quality and reducing noise levels in certain areas, through reduced congestion and removal of traffic from residential areas. The scheme is also being designed to avoid unacceptable impacts on the natural environment and landscape in the Peak District National Park
- **Societal** – by re-connecting local communities along the Trans-Pennine route
- **Capacity** – by reducing delays and queues that occur during busy periods and improving the performance of junctions on the route

2.3 Scheme overview

2.3.1 The Development Consent Order (DCO) boundary[4] for the Scheme can be seen on Volume 3 Figure 2.1.

2.3.2 The Scheme includes the following components:

- A new offline bypass of 1.12 miles (1.8km) of dual carriageway road connecting the junction of the M67, A57(T) and A560 to Mottram Moor Junction;
- A new offline bypass of 0.81 miles (1.3km) of single carriageway connecting the A57(T) Mottram Moor to the A57 Woolley Bridge;
- Creation of two new junctions, Mottram Moor Junction and Woolley Bridge Junction and improvement works to the existing M67 Junction 4;
- De-trunking, including safety measures from the M67 Junction 4 to Mottram Back Moor Junction, to be agreed with Tameside Metropolitan Borough Council (Tameside MBC)
- Safety measures and improvements to the A57 from Mottram Moor Junction to Gun Inn Junction and from Gun Inn Junction to Woolley Lane Junction, to be agreed with Tameside Metropolitan Borough Council (Tameside MBC)
- Creation of five new structures (Old Hall Farm underpass, Mottram Underpass, Carrhouse Lane underpass, River Etherow Bridge and Roe Cross Road Bridge); and
- One main temporary construction compound area located close to the M67/A57(T)/A560 Junction.
- Associated works for temporary access, temporary lay-down, work areas and ancillary works would also be required.

2.3.3 The following changes are also proposed:

- Local advanced signage would be revised to direct all non-local traffic along the new route of the A57, bypassing Mottram;
- The existing speed limit would be reduced to 20mph along the now de-trunked section, running from M67 Junction 4 to the proposed Mottram Back Moor Junction. The remaining sections of the A57(T) would remain at 30mph;

[4] This boundary shows the limits within which works associated with the Scheme may be carried out, including both the temporary and permanent land -take which will be required for the construction and operation of the Scheme

- Traffic calming measures would be employed along the de-trunked route and existing A57, such as speed cushions and priority give way systems, slowing local traffic and discouraging through traffic from using the route. Details of the proposed safety measures would be agreed with Tameside MBC and Transport for Greater Manchester (TfGM) at Detailed Design stage.
- Non-Motorised User facilities, such as footways and cycleways, would be added or improved. A combined footway and cycleway would be installed on the proposed new link road between Mottram Moor and Woolley Bridge, which would create a connection route with the existing Sustrans National Route 62 Trans-Pennine Trail.
- Update to parking restrictions and creation of extra parking spaces along the de-trunked route and existing A57 up to the Gunn Inn Junction.

2.4 Scheme alignment

2.4.1 The Scheme commences with a new connection to the existing M67 Junction 4 at its junction with the A57(T) and the A560.

2.4.2 From M67 Junction 4, an all-purpose dual carriageway would run to the north east across existing farmland towards Mottram Moor Junction.

2.4.3 At Roe Cross Road the Scheme pass under a new overbridge and will enter the proposed Mottram Underpass at Old Road. Mottram Underpass is proposed to be constructed using the cut and cover method to carry the new road beneath Old Road, Old Hall Lane and the community of Mottram.

2.4.4 After exiting the Mottram Underpass, the Scheme would be in cutting of approximately 12 m depth and would turn southwards as it continues towards a new junction, Mottram Moor Junction, immediately south of the existing Mottram Moor. This would take the form of signalised junction connecting Mottram Moor with the new Mottram Moor Link Road.

2.4.5 The de-trunked sections of the A57 at Mottram Moor Junction would be connected to the proposed junction in the form of uncontrolled junctions to retain access to the existing properties in this area.

2.4.6 The route then continues as an all-purpose single carriageway, across existing farmland, heading toward the River Etherow. A new structure would be constructed to carry the Scheme over the River Etherow.

2.4.7 The route would then terminate at a new signal controlled ‘T’ junction on the A57 at Woolley Bridge, known as Woolley Bridge Junction.

2.5 Earthworks design

2.5.1 All junctions would be as close to grade as possible to avoid significant construction costs and access issues. Between the junctions, the existing ground levels (EGLs) rise and fall between 4mAOD and 23mAOD. To achieve the required profile, there are various locations where the route goes into cutting or is on embankment. Tables 2-1 and 2-2 below highlight the locations of the cutting and embankment slopes, which are shown in Volume 3, Figure 2.2

Table 2-1 - Eastbound cutting and embankment Slopes

Eastbound cutting/embankment	Chainage (location of chainage shown on Volume 3 Figure 2.2 of this PEIR)	Maximum slope height (from EGL)
SECTION 1 (Chainage 0-715)		
False Cutting[5] (1:2 inner face, 1:3 outer face)	0-120	2.00 m
At Grade	120-200	N/A
Cutting	200-290	-0.7 m
Embankment	290-550	1.95 m
False Cutting (1:2 inner face, 1:3 outer face)	550-715	4 m inner face height, 6.80 outer face height
SECTION 2 (Chainage 715-1690)		
Embankment	715-760	3.3 m
Cutting	760-870	-5.9 m
Cutting	1100-1450	-14.04 m
Cutting	1450-1510	-4.00 m
Embankment	1510-1690	13.17 m
SECTION 3 (Chainage 1690-3070)		
Embankment	1810-1860	3.8 m
False Cutting (1:2 inner face, 1:3 outer face)	1860-2250	2.00 m inner face height, 7.2 m outer face height
Embankment	2250-2360	0.9 m
Embankment	2360-2920	6.5 m
Embankment	2985-3070	3.05 m

[5] False cuttings use earthwork embankments a means of screening the road from receptors (human and animal) in the surrounding landscape

Table 2-2 - Westbound cutting and embankment Slopes

Westbound cutting/embankment	Chainage (location of chainage shown on Volume 3 Figure 2.2)	Maximum Slope Height (from EGL)
SECTION 1 (Chainage 0-715)		
Embankment	0-60	7.027 m
Embankment	60-550	3.9 m
False Cutting (1:2 inner face, 1:3 outer face)	550-640	3.50 m inner face height, 10.53 m outer face height
SECTION 2 (Chainage 715-1690)		
False Cutting (1:2 inner face, 1:3 outer face)	640-720	3.50 m inner face height, 9.5 m outer face height
Cutting	720-890	-5.0 m
Cutting (Benched)	1100-1450	-8.7 m
Cutting	1450-1530	-4.00 m
Embankment	1530-1690	8.57 m
SECTION 3 (Chainage 1690-3070)		
False Cutting (1:2 inner face, 1:3 outer face)	1800-2060	4.00 m inner face height, 7.10 m outer face height
Embankment	2060-2400	3.14 m
False Cutting (1:2 inner face, 1:3 outer face)	2400 - 2430	2.50 m inner face height, 6.8 m outer face height
False Cutting (1:2 inner face, 1:3 outer face)	2430-2700	1.00 m inner face height, 8.90 m max. outer face height
Embankment	2700-2920	4.25 m
Embankment	2985-3070	4.82 m

2.6 Highways structures

2.6.1 Table 2-3 presents a list of the proposed structures along the Scheme.

Table 2-3 - List of structures

Name of structure	Details of proposed works
Old Mill Farm Underpass	New 30 m length farm access/public right of way (PRoW) underpass (5.5 m wide x 4.5 m high in cross section) beneath main carriageway at chainage 514.622
Mottram Underpass	New 140m long, underpass carrying the carriageway mainline beneath Roe Cross Road, Old Road and the community of Mottram. The top of the underpass would be 2 m below ground level.

Name of structure	Details of proposed works
Carrhouse Lane Underpass	New 38m length access road/PRoW underpass (6.0 m wide x 5.5 m high in cross section) beneath main carriageway at chainage 2173.544
River Etherow Bridge	Construction of new 42 m long, one span river bridge between chainage 2963 and 3005
Drainage Culvert Chainage 0030	New 2 m x 1.5 m precast concrete box culvert
Drainage Culvert Chainage 0150	New 1200 precast concrete pipe culvert
Drainage Culvert Old Mill Farm	New 1200 precast concrete pipe culvert
Drainage Culvert Chainage 0700	New 1200 precast concrete pipe culvert
Drainage Culvert Chainage 1650	New 3 m x 2 m precast concrete box culvert
Drainage Culvert Chainage 2020	New 1500 precast concrete pipe culvert

2.6.2 Construction details of all proposed structures will be determined through the design phase and provided in the ES.

2.7 Highways drainage

2.7.1 The new highway drainage would be designed to meet the requirements of Highways England, as well as stakeholders including the Environment Agency, local authorities and United Utilities. It is envisaged that along the length of the Scheme, attenuation ponds would be used to reduce the flow into outfall to existing watercourses.

2.8 Highways lighting

2.8.1 The requirement for lighting is currently being developed and the extent of any new lighting is not yet confirmed.

2.8.2 The lighting design would minimise light pollution which can cause sky glow, glare and light trespass. The design of the lighting would take into account potential landscape and ecological effects.

2.8.3 A high-level assessment of the changes to the landscape and visual receptors resulting from the introduction of lighting associated with the Scheme has been undertaken. Further details can be found in Chapter 7 Landscape and visual effects.

2.9 Improvements to local roads

2.9.1 We are proposing a package of measures to improve local roads that are affected by the Scheme. These are split into two categories:

- Firstly, detrunked roads which are roads that are currently maintained by Highways England which we intend to transfer the responsibility to the relevant local highway authorities; and
- Secondly, roads that are and would remain in the ownership of the local highway authority.

2.9.2 For both categories of roads, we are working with Tameside MBC to establish a suitable package of measures to improve the local roads and maximise the benefits of the Scheme.

2.10 Non-Motorised User (NMU) provision

2.10.1 Where the proposed route would affect existing Public Rights of Way (PRoW) and bridleways, replacement network provision would be made to ensure routes remain open by providing suitable crossing points or diversions.

2.10.2 All junctions that interface with pedestrians, cyclists and horse riders. (NMUs), would be designed to take account of NMUs. Current provisions include:

- Replacement connections for the existing footpaths and bridleways severed by the scheme;
- Improved pedestrian and cyclist crossing facilities at the M67 Junction 4, and all new junctions created by the scheme;
- PRoW LON 52-20, which is to be temporarily severed, will be re-instated and upgraded from a footpath to a bridleway, therefore increasing the availability of suitable equestrian facilitates away from road traffic; and
- A combined footway and cycleway along the new A57 Link Road between Mottram Moor and Woolley Bridge, creating a route to link Mottram to the Trans-Pennine Trail (National Cycle Network route 62).

2.10.3 All NMU (pedestrians, cyclists and horse riders) provision on the existing A57(T) and A57 would be maintained with possible improvements that would be agreed with the relevant local highway authorities. Any cycle lanes delivered by the Scheme would be designed for future cycle lane connectivity along the de-trunked corridor.

2.10.4 NMUs would be encouraged to use facilities provided along the existing A57 corridor. For safety reasons, NMUs would be prohibited from using the section of the Mottram Moor Link Road between the Old Mill Underpass and Mottram Moor Junction, due to the Mottram Underpass.

2.11 Flood Risk Assessment

2.11.1 The Flood Risk Assessment (FRA) will be carried out in accordance with the requirements of the National Planning Policy Framework (NPPF), Defra (2012) and its accompanying Technical Guidance (Defra, 2014), and the Environment Agency's Climate change allowances for planners' NPPF supporting guidance (EA, 2017). All sources of flood risk will be assessed.

2.11.2 The FRA will be developed in consultation with the Environment Agency (EA) and informed by hydrological and hydraulic modelling of a number of watercourses within the vicinity, taking account of the influence of the Longdendale reservoir chain. The FRA will be further developed to inform the design of any necessary flood risk management measures and to provide data to feed into the ES.

2.12 Construction

M67 Junction 4

2.12.1 The construction of the link road onto the existing M67 Junction 4 will likely require some lane closures on the roundabout carriageway to allow the new connection to be built.

Mottram Moor Junction

2.12.2 Construction of Mottram Moor Junction would require a series of lane closures. It is anticipated that once parts of the new carriageway are complete, traffic would be temporarily diverted onto them to facilitate construction of the remaining sections of the junction. Access would be maintained to all existing properties at all times.

Woolley Bridge Junction

2.12.3 Construction of Woolley Bridge Junction would be likely to require a series of lane closures on the existing Woolley Bridge Road. It is anticipated that after discussion with the local highway authority, it would be necessary to ensure that a minimum of a single lane is required at this location.

Mottram Underpass

2.12.4 Mottram Underpass is proposed to be constructed using the cut and cover method. It is currently planned that the underpass would be constructed in a number of sections. Three existing roads cross the underpass - Roe Cross Road, Old Road and Old Hall Lane. It is proposed that traffic flows would be maintained on Roe Cross Road and Old Road during underpass construction. This would be by the use of a temporary road which would be constructed adjacent to the existing roads. Traffic would then be diverted onto the temporary road until the works were completed and the existing roads reinstated in their previous locations. Proposals are currently being considered for Old Hall Lane, but Old Hall Lane may be temporarily severed for the duration of the works in that area. Access would be provided from either side of the works, and NMUs along Old Hall Lane would be provided with a temporary diversion for the duration of the closure.

Mottram Moor Link Road and the A57 Link Road

2.12.5 The construction of the Mottram Moor Link Road and the A57 Link Road would require significant excavations and deposition of fill material to achieve the required vertical profile. Interfaces with existing PRoW would need to be managed.

Haulage Routes and Construction Traffic Management

2.12.6 Access for construction vehicles to the site would be from the trunk road network on designated routes which would be clearly signposted.

2.12.7 Haul routes within the Scheme area would be dictated by the balance of cut and fill within the site areas. This itself would be dictated by the design of the new roads and the suitability of the materials arising and their suitability for beneficial re-use.

2.12.8 The main areas where the construction sites would interface with the travelling public would be at locations where connections to the existing network would be created. In these locations, extensive traffic management would be required to segregate the construction sites from road vehicles.

2.13 Demolition

2.13.1 A number of buildings would need to be demolished to construct the Scheme. These are:

- 32, 34, 36, 38 and 40 Four Lanes;
- Sheds on Land at 40 Four Lanes;
- 8A, 8B and 8C Old Road;

- 17, 19 and 21;
- 5, 6, 7, 8 and 9 Tollemache Close (including garages);
- Garages only of 3 and 4 Tollemache Close;
- 2a, 2b, The Chestnuts, 4 and 6 Old Hall Lane;
- Stables, 103 Mottram Moor;
- Outbuildings (greenhouses/polytunnels) within DCO boundary at Robin Hood Farm; and
- Outbuildings within DCO boundary at Tara Brook Farm.
- Units J, H, K and L, Roe Cross Industrial Estate; and

2.13.2 The following buildings could potentially require to be demolished dependent upon the developing construction methodology:

- 25 Four Lanes; and
- 21a Old Road

2.13.3 The right to compensation and methods and procedures for assessing appropriate levels of such would be identified in relation to the National Compensation Code.

2.14 Services and utility diversions

2.14.1 A number of services would be required to be diverted where the new junctions intersect with the existing highway network.

2.14.2 A significant number of utilities would also be required to be diverted on Roe Cross Road, Old Road and Old Hall Lane due to the construction of Mottram Underpass.

2.15 Waste management

2.15.1 An Outline Site Waste Management Plan (SWMP) and a Materials Management Plan (MMP) would be prepared (and submitted in support of the DCO application) following the protocols within the 'Contaminated Land: Applications in Real Environments (CL:AIRE) Definition of Waste: Development Industry Code of Practice'. This is to ensure that excavated material is re-used appropriately, sustainably and remain outside the waste hierarchy. These documents would be further developed by the appointed contractor(s) prior to construction.

2.16 Key environmental constraints

2.16.1 A plan showing the key environmental constraints is provided in Volume 3 Figure 2.3 of this PEIR.

2.16.2 The Scheme is located within two Air Quality Management Areas (AQMAs) where air pollutant concentrations exceed national air quality objectives. These are the Greater Manchester AQMA and the Sheffield Citywide AQMA.

2.16.3 In addition, High Peak Borough Council designated an AQMA in the Tintwistle area and in the Dinting Vale/Glossop area

2.16.4 There is one Scheduled Monument, two Conservation Areas, two Grade II* Listed Buildings and 45 Grade II Listed Buildings and other non-designated assets within the vicinity 500 m of the Scheme.

2.16.5 The Scheme falls within the transitional zone between the open moorlands of the Dark Peak and Southern Pennines, and the densely populated urban conurbation of

Manchester. The Scheme also lies within the setting of the Peak District National Park

2.16.6 Two statutory designated for nature designation lie within 2 km of the Scheme, which are:

- Hurst Clough Local Nature Reserve (LNR), situated 345 m south of the Scheme; and
- Great Wood LNR, situated 1.3 km south of the Scheme

2.16.7 The habitats within the Scheme study area have the potential to support notable and protected species, in particular bats, badger, birds, otter, mammals and aquatic invertebrates.

2.16.8 The dominant source of noise in the proximity of the Scheme is road traffic noise. There are four Noise Important Areas (NIAs) in the proximity of the Scheme.

2.16.9 There are three surface water bodies identified in the study area, the River Etherow, the Glossop Brook and Hurstclough Brook.

2.17 Preliminary outline environmental design

2.17.1 One of the key functions of undertaking an EIA for a scheme is to inform the design. This Scheme design is an iterative process which would take into consideration the key significant effects on environmental receptors and the mitigation proposed.

2.17.2 Embedded mitigation refers to measures that have been incorporated into the design of the Scheme. The following preliminary environmental design and embedded mitigation are being considered for incorporation into the Scheme.

- Environmental barriers in the form of earth mounding or acoustic fencing to provide screening from increased noise levels during the Scheme's operational phase. If utilised as part of a landscaping strategy, the earthworks can also be planted to minimise visual impacts on the landscape and local residents;
- Measures to control water pollution and methods to drain surface water from the site effectively. This could include Sustainable Drainage Systems (SuDs), surface water outfalls, soakaways, and the creation of attenuation ponds;
- A landscaping strategy for the Scheme to integrate the new highway with the local character of the surrounding landscape and soften the visual impact. This landscaping strategy aims to reduce impacts on the existing landscape and for local residents and where possible provide enhancements through sensitive planting and landform design;
- Opportunities for habitat creation and enhancement through an appropriate planting scheme, artificial bat roosting and bird nesting boxes and artificial badger setts. New wildlife corridors and underpasses would be incorporated within the structures designed into the Scheme. All new planting would be appropriate to local habitats;
- Piling techniques associated with the new bridge, crossing the River Etherow would be reviewed and appropriate design will be included to safeguard the underlying groundwater regime to ensure that groundwater quality is not compromised.

2.17.3 Furthermore, Highways England's Biodiversity Plan[6], published in June 2015, details the aims and obligations it has to deliver as part of the Government's RIS in terms of

[6] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/441300/N150146_-_Highways_England_Biodiversity_Plan3lo.pdf

biodiversity. Highways England is expected to ensure the design of their road schemes reduce impacts on the environment by delivering a reduction in habitat fragmentation and enhancing biodiversity value. Habitats should be actively managed to ensure high species diversity and reduced fragmentation. This is further supported by Highways England's Licence (April 2015) within paragraphs 4.2g, 4.2h (principles of sustainable development) and 5.2.

2.17.4 In accordance with the Biodiversity Plan, all schemes included within the RIS should aim to ensure no net loss across Highways England's activities and continue to progress towards the target of delivering a net gain in biodiversity by 2040.

2.17.5 The Highways England Delivery Plan 2020-2025[7] (the second roads period) also sets this commit to no net-loss of biodiversity, as well as the following performance targets:

- to mitigate noise in at least 7,500 households in mitigated Noise Important Areas (NIAs), defined by Defra, using funding from the Environment and Wellbeing Fund during the second road period;
- Bring links agreed with the Department for Transport and based on their Pollution Climate Mapping model into compliance with legal NO_2 limits in the shortest timescales possible; and,
- Reduce Highways England's carbon emissions as a result of electricity consumption, fuel use and other day to day operational activities during the second road period to levels defined by baselining and target setting activities in 2020-21.

2.18 The Rochdale Envelope

2.18.1 EIA is an iterative process, and the Scheme may include somewhat uncertain aspects. At the time that the ES is submitted, it is proposed that no aspects of design would vary so much as to represent effectively different schemes. The EIA would ensure it addresses the potential for a range of impacts resulting from any undecided parameters

2.18.2 The Planning Inspectorate Advice Note 9: Using the 'Rochdale Envelope'[8] provides guidance regarding the degree of flexibility that may be considered appropriate within an application for development consent under the Planning Act 2008. The Advice Note acknowledges that there may be parameters of a Scheme's design that are not yet fixed and, therefore, it may be necessary for the ES to assess likely worst-case variations to ensure that the likely significant environmental effects of the Scheme have been assessed.

2.18.3 Within this PEIR, a developed concept design for the Scheme is presented. The Scheme is to be developed further through the reference design and this would form the basis for the DCO application. Therefore, when presenting the Scheme design in the ES and the accompanying assessment, the requirements of the Planning Inspectorate's Advice Note 9 would be reflected. Where flexibility is sought in the scheme design, the maximum potential adverse impacts of the Scheme will be assessed.

2.18.4 For the ES assessment it is likely that the de-trunking of the A57 will not be finalised. For the purpose of the ES, a number of assumptions will need to be made which could include:

[7] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/910866/5-year_Delivery_Plan_2020-2025_FINAL.pdf
[8] https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2013/05/Advice-note-9.-Rochdale-envelope-web.pdf

- Traffic calming measures employed along the de-trunked route, including speed cushions and priority give way systems, slowing local traffic and discouraging through traffic from using the route;
- NMU facilities, such as footways and cycleways added or improved;
- Removal of parking restrictions and creation of extra parking spaces along the detrunked route; and
- Upgraded street lighting along the de-trunked route and lighting along the new route of the A57.

2.18.5 The ES will confirm maximum and other dimensions of the Scheme, and that any changes to the development within such parameters would not result in significant impacts not previously identified and assessed.

2.18.6 This would ensure that the likely significant effects of the Scheme are assessed. Furthermore, the reference design would be informed by the EIA and the outcome of the pre-application consultation process, with the design reflecting iterative working between the designers and the environmental specialists.

3 Assessment of alternatives

3.1 Introduction

3.1.1 This chapter summarises the assessment of alternatives undertaken for the Scheme and sets out the justification for the chosen option (the Scheme within this PEIR).

3.1.2 During the intricate history of work in this area, numerous options have been considered and discarded to address the longstanding connectivity and congestion issues identified, as summarised in Table 3-1.

3.1.3 Whilst the Scheme presented within this PEIR is considered a separate scheme to those presented in Table 3-1, it has been informed by learning from historic options studies. For example, options generally considered to be less preferable were not reconsidered as part of the alternatives assessed for this Scheme, and design development has been informed by historic study information, where applicable.

Table 3-1 - Background of Scheme

Scope of Scheme	Year	Detail of events
Scheme to alleviate traffic congestion along the A57/A628 trunk road through Mottram, Hollingworth (in the Tameside district of Greater Manchester) and Tintwistle (in the High Peak district of Derbyshire and partly within the Peak District National Park) -	1989	Scheme was first introduced to the Roads Programme.
	1992/1993	Following appraisal of alternatives, two routes were presented at Public Consultation in 1992 and in October 1993, the Secretary of State announced a Preferred Route for a bypass scheme
	1996	The bypass was suspended from the Roads Programme
Scheme to solve the traffic problems within the three villages of Mottram, Hollingworth and Tintwistle and within the wider area	1998	The A57/A628 Mottram -Tintwistle Bypass and A628/A616 Route Restraint Measures was listed as a scheme for which preparation would continue to enable it to be taken forward without delay, subject to full appraisal and the views of the Regional Planning Bodies. In 1999 was approved subject to further appraisal
	2000	The Highways Agency[9] conducted an assessment of the impacts of various strategies (including an HGV lorry ban, public transport improvements and a bypass option) The assessment concluded that there were no realistic alternatives to a bypass of the villages. The results of these assessments were presented to the Regional Planning Bodies in November 2002 and, following their approval, a scheme was included in the Government's Targeted Programme of Improvements (TPI) in April 2003.
	2003	The preferred route was promoted - a bypass of approximately 5.7km in length, which would bypass the existing A57/A628 route in the villages of Mottram, Hollingworth and Tintwistle, with a link road connecting to the A57 at Mottram Moor between Mottram and Hollingworth.

[9] Note the Highways Agency has since been superseded by Highways England

Scope of Scheme	Year	Detail of events
		An extension of this link road was being promoted jointly as the Glossop Spur by Tameside Metropolitan Borough Council and Derbyshire County Council
	2007	Both the A57/A628 Mottram - Tintwistle Bypass and A628 Route Restraint Measures, and the Glossop Spur projects were subject to public inquiry.
	2009	The projects were subsequently withdrawn from public inquiry and the A57/A628 Mottram - Tintwistle Bypass and A628 Route Restraint Measures project was removed from the Highways Agency programme
Longdendale Integrated Transport Strategy (LITS) – (promoted by Tameside Metropolitan Borough Council	2009	Following the decision of the Highways Agency to withdraw from promoting the Mottram to Tintwistle bypass, Tameside Metropolitan Borough Council started developing alternative proposals. Six options were presented for consultation including public transport options, highway options and a combination of both.
	2010	LITS became subject to government spending cuts and was consequently scrapped, although a two of the options were used to inform the Trans-Pennine Feasibility Study (as below)

3.2 The Trans-Pennine Feasibility Study

3.2.1 In 2015, the Department for Transport (DfT) commissioned a series of feasibility studies[10] to investigate solutions to some of the most significant and longstanding congestion hotspots in the country. A study was undertaken to identify the opportunities and understand the case for future investment on Trans-Pennine routes that will improve connectivity between Manchester and Sheffield, and that are deliverable, affordable and offer value for money. This study considered three western end variants of:

- Bypass of Mottram, Hollingworth and Tintwistle;
- Mottram Moor Link Road; and
- A57 Mottram One Way.

3.2.2 The study also recognised a need for a central package of improvements along the A57/A628/A61 to accompany each western end variant, which included the A57(T) to A57 Link Road.

Early Options Sifting Exercises

Coverage of the Sifting Process

3.2.3 The initial options at the time of sifting were in relation to the Mottram Moor Link Road and A57(T) to A57 Link Road.

3.2.4 This decision to progress this western end variant (in conjunction with the central package of improvements) was based on this option having a good strategic fit and alignment with stakeholder aspirations. Additionally, it is expected to deliver a positive effect on the economy at a lower cost than the full Mottram, Hollingworth and

[10] https://www.gov.uk/government/publications/trans-pennine-routes-feasibility-study-technical-reports

Tintwistle bypass whilst providing good journey time and reliability benefits. The overall recommendation for this option being progressed was based on:

- A high value for money case which would improve connectivity between Manchester and Sheffield to some extent but recognises that it does not provide significant additional capacity for these trips.
- Journey time benefits for both local trips from in and around the Mottram/Tintwistle/Glossop area and for existing Trans-Pennine trips using the A628 or A57, with an expected improvement in reliability for all users.
- Effective in reducing delays on the A628 and A57 and moves traffic from the village of Mottram, which will bring benefits for local residents in the form of improved air quality, less noise, reduced accidents and reduced severance.
- Expected to bring slight adverse impacts to the landscape, noise, historic environment, biodiversity and the water environment.
- Anticipated that delivery of all elements of the package could be completed by early 2023.

3.2.5 A decision was made to extend the brief to include options to benefit Hollingworth and Tintwistle; and so the Brown Route, Red Route and Blue Route options were brought into the sifting process. These were considered with the intention of progressing a longer bypass option as part of a phased approach due to funding being unavailable within the current RIS.

3.2.6 An original long list of nine Mottram Moor Link Road options were presented to Highways England in September 2015. In accordance with the design brief, these included long bypass options (of Mottram, Hollingworth and Tintwistle) and short bypass options (of Mottram only) and included the option to include or exclude the A57(T) to A57 Link Road.

3.2.7 These nine options were:

- Options 0, 3 & 4 – options for A57(T) to A57 Link Road crossing the A57(T) close to Mottram (Volume 3 Figure 3.1).
- Options 1, 2 & 5 – options for A57(T) to A57 Link Road crossing the A57(T) closer to the Gun Inn Junction at Hollingworth (Volume 3 Figure 3.2).
- Brown Route, Blue Route and Red Route – options for a Mottram, Hollingworth, and Tintwistle Bypass (Volume 3 Figure 3.3). The Brown Route was the preferred route for the Mottram, Hollingworth and Tintwistle Bypass taken to Public Inquiry in 2007.

First Sift (Strategic Sift)

3.2.8 This sift was completed using the Early Assessment and Sifting Tool (EAST) alongside an Additional Sift Tool which considered the performance of each option against the Trans-Pennine Upgrade objectives.

3.2.9 Highways England decided that this sifting exercise should be completed in an attempt to inform a strategic decision as to whether to pursue a long or short bypass. For this reason, the First Sift exercise was completed using one long and one short bypass option (Option A, formerly Option 0 and Brown Route), considering these both with and without the inclusion of the A57(T) to A57 Link Road.

3.2.10 The first sift included the following elements:

- Appraisal using an Additional Sifting Tool;

- Appraisal using the EAST; and
- A high-level economic assessment using TUBA (Transport Users Benefit Analysis).

3.2.11 The following broad conclusions were drawn from the first sift.

- The Brown Route performs better economically than Option A route (both with and without the A57(T) to A57 Link Road);
- Options with the A57(T) to A57 Link Road perform better than the comparative option without the A57(T) to A57 Link Road.

3.2.12 A decision was made to remove options without the A57(T) to A57 Link Road, as these performed less well. However, a strategic decision between long and short bypass options could not be made at the time of sifting, and so it was decided to proceed to a Long List Sift.

Long List Sift Exercise

3.2.13 This sift was completed using the EAST, alongside an Additional Sift Tool which considered the performance of each option against the Trans-Pennine Upgrade objectives.

3.2.14 The nine Mottram Moor Link Road options (Section 3.2.7) presented in September 2015 were all considered as part of the Long List Sift, all with the inclusion of the A57(T) to A57 Link Road.

3.2.15 The options discarded at this stage were:

- Options 1 and 2: The proximity of these two options to the Gun Inn Junction affected the potential deliverability and feasibility in comparison to Option 5 which is of a similar alignment.
- Options 3 and 4: The highway alignment of these two options was less preferable in terms of Highways Standards in comparison to Option 0.
- Blue Route: This route would pass directly between Hollingworth and Tintwistle, potentially bringing additional severance issues between the two villages. The route would also include the upgrade of the existing road within Tintwistle Conservation Area.
- Red Route: This route would require construction over the top of Arnfield Reservoir, which was considered to pose deliverability challenges.

3.2.16 The best performing options that were taken forward to the Second Sift Exercise were:

- Brown Route. It was the better performing of the Mottram, Hollingworth, & Tintwistle type options considered in the Long List Sift.
- Option 0. This option was appraised in the original first sift and was considered the better performing of the Mottram Moor Link Road options considered which cross the A57(/T) closer to Mottram.
- Option 5. This option was considered to be the better performing of the Mottram Moor Link Road options considered which cross the A57(T) closer to the Gun Inn at Hollingworth.

3.2.17 A historic options review exercise was undertaken, which rediscovered a potentially feasible option that had not been previously rejected. This option is referred to as ‘DfT Low Cost Option 1’ and is shown on Volume 3 Figure 3.4. This option was also

considered a viable alternative to the Brown Route and was therefore taken through to the Second Sift Exercise, alongside Options 0, 5 and Brown Route.

Second Sift Exercise

3.2.18 The second sift exercise was undertaken using 'Transport Appraisal Process' (TAG) Transport Business Case[11] criteria Option Assessment Framework, provided within the TAG Unit. The assessment areas were as follows:

- Strategic Fit;
- Value for Money
- Financial Case;
- Delivery Case; and
- Commercial Case

3.2.19 The options presented for Second Sift were:

- Brown Route including A57(T) to A57 Link Road (long bypass);
- DfT Low Cost Option 1 including A57(T) to A57 Link Road (long bypass);
- Mottram Moor Link Road Option A, including A57(T) to A57 Link Road (short bypass); (formerly Option 0), and
- Mottram Moor Link Road Option B (formerly Option 5) including A57(T) to A57 Link Road (short bypass).

3.2.20 During a Value Management workshop, the benefits and dis-benefits of the four options were considered. The two long bypass options were expected to attract significantly more traffic to the area, plus bring about additional impacts in relation to the Peak District National Park, air quality and noise. The two long bypass options did provide the higher cost-benefit ratio in comparison to the short bypass options.

3.2.21 At the Value Management workshop, the risk relating to funding for a long bypass being unavailable within the current RIS was highlighted, and the decision was made to take the following two options through to the next stage:

- Mottram Moor Link Road Option A (short bypass) (shown as Option 0 in Volume 3 Figure 3.1); and
- Mottram Moor Link Road Option B (short bypass) (shown as Option 5 in Volume 3 Figure 3.2).

3.3 Justification for Chosen Option

3.3.1 On 22 June 2017, a Value Management Workshop was held to ensure the options proposed for the 'Preferred Route Announcement' met the high-level strategic drivers defined in the Client Scheme Requirements, which are:

- Encouraging economic growth;
- Making the network safer;
- Keeping the network in good condition;
- Supporting the smooth flow of traffic;

[11] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/712965/webtag-transport-appraisal-process-may-2018.pdf

- Delivering better environmental outcomes;
- Helping cyclists, walkers and other vulnerable users of the network;
- Improving user satisfaction; and
- Achieving real efficiency.

3.3.2 Whilst considering the merits of Option A and Option B of the Mottram Moor Link Road/A57(T) to A57 Link Road, Option A and Option B both met the transport objectives as defined in the Client Scheme Requirements, the workshop identified Option A as the preferable option due to:

- Less impact on properties;
- Lower cost than Option B; and
- Option A was preferred by the majority of respondents to the non-statutory consultation undertaken in March and April 2017.

3.3.3 It was therefore been recommended that Option A should be progressed as the preferred route and was subsequently included in the 'Preferred Route Announcement' made on 2 November 2017.

3.3.4 As highlighted in Section 1.5.7, revisions to the Scheme have been made to the Preferred Route since the last consultation in 2018. These are outlined below in Table 3-2.

Table 3-2 - Scheme updates since the Preferred Route Announcement

Previous design	Design change since 2018 consultation, with reasoning
Roe Cross link road, junction and roundabout	Updated traffic modelling suggested that the Roe Cross link road, junction and Cricket Ground roundabout could be removed from the scheme, without compromising the improvements to traffic levels. This avoids the need for a new road, 7 m high embankment and signal-controlled junction *Environmental benefits:* reduced the impacts of the scheme on wildlife, watercourses and views from neighbouring properties and also makes construction cheaper, quicker and less disruptive.
Mottram Underpass	The previous proposal for the Mottram Underpass had its eastern portal to the west of the existing route of Old Hall Lane. But, as this is the site of a geological fault line in the ground, a large, complex structure, with 50m concrete wing walls was needed, in order to make sure the construction was safe. The revised proposal moves the underpass 20 m to the east, to span the fault line, which significantly reduces the risks involved. *Environmental benefits:* This change simplifies the design, by using earthworks instead of concrete; reducing the length of the wing walls to approximately 10 m; reducing the depth of the cutting itself; and retaining Old Hall Lane on its current alignment. The new design will blend in better with the landscape; and will be cheaper, quicker and easier to construct, reducing disruption to the local community. A new amenity green space will be created on top of the underpass.

Previous design	Design change since 2018 consultation, with reasoning
Proposed roundabout at Mottram Moor	Replacement of the proposed roundabout with a signal-controlled junction. The traffic modelling suggested that a crossroads with traffic lights would achieve future reserve capacity[12], improving journey times, by reducing delays. *Environmental benefits:* This change reduces the amount of land needed; as well as the impacts of the scheme on wildlife and views from neighbouring properties.
River Etherow Crossing	The route needs to cross the River Etherow. The previous proposal was a 60m long bridge, with a supporting structure halfway across. This length is needed to create a flood channel, that could drain off water if needed. However, updated hydraulic modelling of the River Etherow confirmed that flood risks could be managed by subtly reshaping the channel and the surrounding floodplain itself. This has allowed removal of the flood channel from the design, as it is no longer required, shorten the bridge to 42 m and removal of the supporting structure. *Environmental benefits:* This would reduce the amount of land and materials required to construct the crossing and make it easier, cheaper and quicker to build.
Woolley Bridge Junction and link road	Because of the new signal-controlled design at Mottram Moor the route of the road connecting it with the proposed junction at Woolley Bridge has been updated. *Environmental benefits:* The design of the junction itself has also been slightly updated to avoid impacts on a nearby farmhouse and not affect any future access requirements to a proposed future housing development.
Construction of two underpasses at Old Mill Farm and Carrhouse Lane	Old Mill Farm Underpass and Carrhouse Lane Underpass are both proposed to maintain farm access and provide a safe route for walkers, cyclists and horse riders. The design has been updated to relocate the Carrhouse Lane Underpass, moving it 10 m closer to the existing road. Environmental benefits: Improved access.

3.3.5 The justification for not taking forward other options and the stage at which the option was disregarded is summarised within Table 3-3.

[12] in the future the junction will still have spare operating capacity.

Table 3-3 - Alternative Assessment - Options not taken forward

Option/ Description	Stage not taken forward	Justification for not taking forward
Option A (Formerly Option 0) (long bypass without the A57(T) to A57 Link Road	First Sift (Strategic Sift)	Highways England decided that a sifting exercise should be completed in an attempt to inform a strategic decision as to whether to pursue a long or short bypass. For this reason, the First Sift exercise was completed using one long and one short bypass option (Option A and Brown Route), considering these both with and without the inclusion of the A57(T) to A57 Link Road. The following broad conclusions were drawn from the first sift. • The Brown Route performs better economically than Option A route (both with and without the A57(T) to A57 Link Road) • Options with the A57(T) to A57 Link Road perform better than the comparative option without the A57(T) to A57 Link Road A decision was made to remove options without the A57(T) to A57 Link Road, as these performed less well. However, a strategic decision between long and short bypass options could not be made at the time of sifting, and so it was decided to proceed to a Long List Sift.
Brown Route (short bypass without the A57(T) to A57 Link Road)		
Option 1	Long List Sift Exercise	The proximity of these two options to the Gun Inn junction affected the potential deliverability and feasibility in comparison to Option B which is of a similar alignment.
Option 2		
Option 3		The highway alignment of these two options was less preferable in terms of Highways Standards in comparison to Option A.
Option 4		
Blue Route		This route would pass directly between Hollingworth and Tintwistle, potentially bringing additional severance issues between the two villages. The route would also include the upgrade of the existing road within Tintwistle Conservation Area.
Red Route		This route would require construction over the top of Arnfield Reservoir, which was considered to pose deliverability challenges.
As a result of the historic options review exercise a potentially feasible option was rediscovered that had not been previously rejected. This option is referred to as 'DfT Low Cost Option 1' and is shown on Part 3 Figure 3.4 This option was also considered a viable alternative to the Brown Route and was therefore taken through to the Second Sift Exercise. The options presented for Second Sift were: • Brown Route including A57(T) to A57 Link Road (long bypass) • DfT Low Cost Option 1 including A57(T) to A57 Link Road (long bypass) • Mottram Moor Link Road Option A including A57(T) to A57 Link Road (short bypass) • Mottram Moor Link Road Option B including A57(T) to A57 Link Road (short bypass)		

Option/ Description	Stage not taken forward	Justification for not taking forward
Brown Route including A57(T) to A57 Link Road (long bypass)	Second Sift Exercise	During a Value Management workshop on 22 June 2017, the two long bypass options were expected to attract significantly more traffic to the area, plus bring about additional impacts in relation to the Peak District National Park, air quality and noise. The two long bypass options did provide the higher cost-benefit ratio in comparison to the short bypass options. The risk relating to funding for a long bypass being unavailable within the current Roads Investment Strategy was highlighted, and the decision was made to reject both options.
DfT Low Cost Option 1 including A57(T) to A57 Link Road (long bypass)		
Mottram Moor Link Road Option B including A57(T) to A57 Link Road (short bypass)	PCF Stage 2	Whilst considering the merits of Option A and Option B of the Mottram Moor Link Road/A57(T) to A57 Link Road, Option B was rejected due to: • Impact on more properties than Option A • Higher cost than Option A • Option A was preferred by the majority of respondents to the non-statutory consultation undertaken in March and April 2017

4 Environmental Assessment Methodology

4.1 Purpose of EIA process

4.1.1 Environmental Impact Assessment (EIA) is a process for identifying the likely environmental effects (positive and negative) of proposed developments, and their significance, before development consent is granted.

4.1.2 The aim of the EIA is to ensure the following have been undertaken:

- A thorough assessment of likely effects of a proposed development on the environment;
- Consideration of mitigation measures and alternatives in light of potential environmental effects; and
- Assessment of the cumulative effects of proposed development.

4.1.3 Through the EIA process, the Scheme should incorporate measures to prevent, reduce or offset any significant, adverse environmental effects of the proposals, and enhance the beneficial effects. The findings of the assessment are presented in an Environmental Statement (ES).

4.1.4 The purpose of the ES is to help the decision maker, statutory consultees, other stakeholders and the public to properly understand the predicted effects and the scope for reducing them, before a decision is made as to whether to permit the development activity. For the Scheme, the DCO application for Highways England will be supported by an ES, produced in accordance with the EIA Regulations.

4.1.5 The EIA Regulations impose procedural requirements for carrying out EIA for NSIPs which fall to be considered as 'EIA development'. The ES is the document that reports on the likely impacts on the environment resulting from the proposed development. The ES must, as a minimum, comply with Schedule 4, Part 2 of the EIA Regulations. Advice published by the Planning Inspectorate states that the ES should clearly explain the processes followed, the forecasting methods used, and the measures envisaged to prevent, reduce and where possible offset any significant adverse effects. This has been undertaken in respect of the PEIR and will continue to be carried out throughout the EIA process.

4.1.6 The following sections provide background to the EIA work that has been completed to date for this Scheme and also explain how this PEIR has been prepared.

4.2 EIA stages

4.2.1 The key stages in the EIA process prior to an application for a DCO being submitted are:

1. Scoping to identify significant issues to be covered in the assessment, determine the subject matter of the assessment and determine the methodologies for undertaking the EIA. Baseline surveys are conducted to establish the existing environmental conditions in the study area;
2. Providing information related to the assessment and the project to the statutory and non-statutory stakeholders (referred to as consultees) and the public so that the parties can make informed contributions to the development of the proposals and the EIA process taking into account the concerns raised by the consultees;

3. Assessment and Iteration to predict the likely significant impacts of the project (including alternatives) on people, environment and communities, identify mitigation measures, if any, through design modifications and environmental management during the project life cycle comprising of construction and operation; and re-assess the residual effects of the mitigated development; and
4. Preparation of an ES and a Non-Technical Summary (NTS).

4.3 Baseline

4.3.1 The existing baseline conditions are defined to enable the changes or impacts that would result from the Scheme to be assessed. The identification of the baseline requires the description of the existing environmental conditions and a prediction of how these are likely to change in the absence of the Scheme.

4.3.2 The description of the baseline conditions should clearly identify receptors that could be affected by the Scheme and their 'value' or 'sensitivity' to potential changes.

4.4 Study area

4.4.1 Study areas have been defined individually for each environmental topic, according to the geographic scope of the potential impacts relevant to that topic or of the information required to assess those impacts. Appropriate study areas have been considered for each environmental topic by the specialist(s) undertaking that assessment and are defined in the topic specific chapters, based on recognised professional guidance where this is available, together with the geographic scope of the potential effects relevant to the topic.

4.5 Design and mitigation process

4.5.1 The design process allows mitigation measures to be incorporated in the proposals, which is termed "embedded mitigation". Where potentially significant adverse environmental effects have been identified during the assessment process, incorporating appropriate mitigation will be an iterative part of design development, following the hierarchy below:

- Avoidance – incorporate measures to avoid the effect, for example, alternative design options or modifying the construction programme to avoid environmentally sensitive periods;
- Reduction – incorporate measures to lessen the effect such as implementing a code of construction practice to reduce the potential impacts from construction activities; and
- Compensation – to be considered in the circumstances where mitigation at the affected location is not possible to avoid or reduce a significant effect, such as offsite provision of new ecological habitat.

4.5.2 In addition, it may be possible to include 'enhancement' i.e. provision of measures over and above those needed to mitigate the adverse impacts, and/or maximising the opportunities for beneficial impacts from the proposals. Environmental effects of the proposals that remain after mitigation measures are taken into consideration (whether embedded in the design or provided as additional mitigation after an assessment of the proposals), are referred to as 'residual effects'. Therefore, the key

outcome of the EIA assessment is to identify the significance of the residual effects after mitigation or enhancement. Each topic chapter sets out the residual effects of the Scheme (as indicated in the structure above).

4.6 Assessment years and scenarios

4.6.1 The assessment of effects compares a scenario with the Scheme operational against the scenario without the Scheme over time, including how the baseline conditions would evolve (with and without the Scheme).

4.6.2 This presence and absence of the Scheme are referred to as the 'Do Something' and 'Do Minimum' scenarios respectively. The 'Do Minimum' scenario represents the future baseline without the Scheme in place, with other changes elsewhere within the Strategic Network, but no construction of new infrastructure associated with the A57. The 'Do Something' scenario is the scenario with the Scheme in place.

4.6.3 Depending on the topic, the effects are assessed for the 'Do Minimum' and 'Do Something' scenarios, during construction, in the opening year and in a future assessment year. For example, for certain topics assessments might be undertaken for a 'design year', usually 15 years after opening.

4.6.4 The current implementation strategy proposes the following key dates, subject to the DCO being approved by the Secretary of State in Autumn 2022:

- Start of construction works – 2023.
- First full year of opening – 2025
- Design year – 2040.

4.6.5 It is assumed that the Scheme will be used to its maximum capacity from opening, but it is likely that there will be a period of growth in throughput over a number of years before the maximum capacity is reached.

4.6.6 Topic specific chapters of this PEIR set out the environmental assessments of the construction and operational effects of the Scheme. The environmental assessment will include consideration of effects arising from the construction and operation of the Scheme. An indefinite design life has been assumed, and the environmental assessment process will therefore not include consideration of decommissioning activities at the end of operational life of the Scheme.

4.7 Identification of potential impacts

4.7.1 Schedule 4 Part 1 Regulation 20, of the EIA Regulations requires:

> *'A description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development, resulting from:*
>
> *The existence of the development;*
>
> *The use of natural resources;*
>
> *The emission of pollutants, the creation of the nuisances and the elimination of waste; and*

The description by the applicant of the forecasting methods used to assess the effects on the environment'.

4.7.2 A range of environmental topics may be affected by the Scheme. Impacts may be negative or positive, temporary or permanent. They may also be described as:

- **Direct or Primary Impacts:** caused by activities which are an integral part of the proposals resulting in a change in environmental conditions, such as construction works causing an increase in dust concentrations in the air;
- **Indirect or Secondary Impacts:** due to activities that affect environmental conditions or the receptors, which in turn affects other aspects of the environment or receptors;
- **Cumulative:** comprising multiple effects from different sources within the proposals (synergistic or interrelationships), or cumulatively with other developments (additive), on the same receptors; and
- **Residual:** effects that remain after the positive influence of mitigation measures are taken into account

4.7.3 Each of these impacts can persist over a period of time and can be considered as:

- **Short term:** temporary effects that would last for a limited duration, for example, noise generated during construction of the Scheme; and
- **Long term:** permanent effects from the operation of the Scheme

4.8 Assessment of significance

4.8.1 The significance of an environmental effect is typically a function of the 'value' or 'sensitivity' of the receptor and the 'magnitude' or 'scale' of the impact. Combining the environmental value of the resource or receptor with the magnitude of change produces a significance of effect category. In arriving at the significance of effect, the assessor also considers whether the effect is direct, indirect, secondary, cumulative, short, medium or long-term, permanent or temporary, positive or negative.

4.8.2 The proposed general approach will be adopted in accordance with relevant legislation, guidance and best practice.

4.8.3 With the receptors identified and their sensitivity classified, the potential impacts of the proposed works to these aspects, for construction and operation where appropriate, will be assessed and the magnitude of the impact determined.

4.8.4 In accordance with DMRB LA 104 Environmental assessment and monitoring[13] standard for each topic, the assessment will combine the magnitude of the impacts and the sensitivity of the resources/receptors that could be affected, in order to classify the significance of effect (see Table 4-1) from very large to neutral.

4.8.5 General descriptors for the significance of effect are provided in Table 4-2.

4.8.6 The proposed general approach will be adopted in accordance with relevant guidance and best practice. It should be noted that this approach is not relevant to the assessment of noise, air quality, and climate (carbon). In these cases, variation in the methodology of assessment significance, will be explained in individual topic sections of the ES.

[13] https://www.standardsforhighways.co.uk/dmrb/search/78a69059-3177-43dc-94bd-465992cfda82

Table 4-1 - Significance of effects

Environmental Value of receptor/ resource (Sensitivity)		Magnitude of impact (degree of change)				
		No change	Negligible	Minor	Moderate	Major
	Very High	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or large	Large or very large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or Slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

Table Source: From Highways England DMRB LA 104 Table 3.8.1

Table 4-2 - Significance categories and typical descriptions

Significance category	Typical descriptors of effect
Very large	Effects at this level are material in the decision-making process.
Large	Effects at this level are likely to be material in the decision-making process.
Moderate	Effects at this level can be considered to be material decision-making factors.
Slight	Effects at this level are not material in the decision-making process.
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Table Source: From Highways England DMRB LA 104 Table 3.7

4.8.7 Where Table 4-1 includes two significance categories, professional judgement will be used to determine the most appropriate level of significance.

4.8.8 The duration of the effect will be assessed to be either temporary or permanent where:

- Temporary (e.g. demolition and construction phase):
  - Short term (< 5 years);
  - Medium term (5-10 years); or
  - Long term (> 10 years); and
- Permanent (e.g. once the proposed works are completed and operational).

4.8.9 Whilst the criteria derived vary between disciplines, from a very formal set of criteria based on nationally recognised standards for air quality, to more qualitative criteria derived to assess landscape impact or heritage, each topic assessment has adopted

the common terminology alongside any topic-specific guidance, and professional judgement to assess the significance of effects. Where an alternative basis of assessment applies, this is explained in the appropriate chapters.

4.9 Cumulative effects

4.9.1 Schedule 4, Part 1, Regulation 20, of EIA Regulations requires an ES to include the assessment of cumulative effects. Cumulative effects are the result of multiple actions on environmental receptors.

4.9.2 The cumulative assessment for the Scheme will also be undertaken in accordance with DMRB LA 104, which states that cumulative effects should be assessed when the conclusions of individual environmental factor assessments have been reached and reported.

4.9.3 There are principally two types of cumulative impact:

- Combined effects: a single project (e.g. numerous different effects impacting a single receptor); and
- Cumulative effects: different projects (together with the project being assessed).

Combined effects

4.9.4 The assessment methodology requires the identification of impact interactions associated with the Scheme on key environmental receptors. This ensures that the ES is not a series of separate assessments collated into one document, but rather a comprehensive assessment drawing together all the environmental effects of the proposals.

4.9.5 The effects identified within the ES's technical topic chapters will be assessed to identify potential combined effects using professional judgement and a qualitative assessment approach. To determine whether there is a potential for combined effects on a receptor, all residual effects will be listed against the receptors affected, so that receptors which would be affected by more than one impact can be identified. Where only neutral or negligible effects are identified, it is considered that there is no potential for combined effects.

Cumulative effects

4.9.6 Schedule 3 Regulation 14(b) of the EIA Regulations refers to the cumulation of impacts with other development. Therefore, the environmental effects of the Scheme will also be assessed in combination with the effects of other projects as part of the EIA process, where relevant information is available. What projects that should be considered as part of a 'cumulative' assessment for these purposes is not defined in the EIA Regulations and there is no standard approach to the assessment of cumulative effects, with different projects adopting different approaches. However, the Planning Inspectorate's Advice Note 17 will be used as a basis for identifying categories of development that should be considered in the cumulative assessment.

4.9.7 In accordance with DMRB LA 104, the different projects that will be included in the assessment will include developments which fall into the following categories, but are not necessarily limited to:

- Road projects which have been confirmed for delivery over a similar timeframe;

- Other development projects with valid planning permissions or consent orders, and for which EIA is a requirement; and,
- Proposals in adopted development plans with a clear identified programme for delivery.

4.9.8 Using these categories, developments will be identified with reference to local knowledge, published information and consultation with local planning authorities in the area.

4.9.9 Preliminary environmental information on the scope of the cumulative assessment is provided in Chapter 15 of this PEIR.

4.10 Major accidents and disasters

4.10.1 In line with the new requirements for major accidents and disasters outlined in Article 3(1) of the EIA Directive, the ES will consider:

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

4.10.2 In considering these elements of vulnerability, the ES will:

- Apply professional judgement in consultation with the Overseeing Organisation to develop Scheme specific definitions of major events. It should be noted that there is no definition of 'Major' in this context;
- Identify any 'Major' events that are relevant to and can affect the Scheme. Major events shall include both man-made and naturally occurring events. Not all events warrant assessment and evidence should be provided to support the view that they should be classified as major events;
- Where Major events are identified, describe the potential for any change in the assessed significance of the Scheme on relevant environmental topics in qualitative terms. Report the conclusions of this assessment within the individual environmental topics; and
- Clearly describe any assumed mitigation measures, to provide an evidence base to support the conclusions and demonstrate that likely effects have been mitigated/managed to an acceptable level.

4.10.3 Major events will be reported within the relevant environmental topic chapters in the ES.

4.11 Transboundary impact screening

4.11.1 EIA Regulation 32 requires the Planning Inspectorate to notify other European Economic Area (EEA) States and publicise an application for development consent if it is of the view that the proposed development is likely to have significant effects on the environment of another EEA Member State, and where relevant to consult with the EEA State affected. A Transboundary impact screening has already been undertaken for the Scheme which determined that no significant effects are identified that could impact on another EEA Member State. Consequently, no transboundary effects are anticipated due to distance and the likely magnitude of impacts from the Scheme.

4.12 Habitat Regulations Assessment

4.12.1 The Scheme falls within one of the Impact Risk Zones (IRZs) for the Peak District Moors (South Pennine Moors Phase 1) Special Protection Area (SPA) and the South Pennine Moors SAC. However, at this distance threshold, the IRZs do not list transport proposals (including roads) as a potential adverse impact. Nevertheless, potential effect pathways between these European Sites and the Scheme have been identified. These relate to increased traffic on the wider road network as a result of, and during the operation of the Scheme. A Habitats Regulations Assessment screening will be undertaken as part of the EIA and submitted with the DCO application.

4.13 Health Impact Assessment

4.13.1 The assessment of potential impacts on health due to the Scheme will not equate to a full Health Impact Assessment (HIA), but the assessment will be informed by good practice guidance for HIA. Human health in the ES will principally be assessed in the Population and Human Health chapter, using the sub-topics Air quality, Landscape and visual, Road drainage and the water environment and Noise and vibration. Health aspects are also incorporated into the assessments for other topics including Air quality and Noise and vibration in accordance with assessment methodology for these topics. For example, Air quality will cover the effects of the Scheme on human health issues relating to air quality.

4.14 Environmental Management Plan

4.14.1 The objective of an Environmental Management (EMP) is to provide the framework for managing the environmental effects of projects, and to demonstrate compliance with environmental legislation throughout all lifecycle stages, as outlined in Table 4-3. The EMP will be produced in line with the DMRB LA 120 Environmental management plans[14] and will outline how the mitigation and management of environmental effects will be delivered and maintained.

Table 4-3 - Delivery schedule and updates of the EMP

Project stage	EMP iteration	Produced/ refined
Design	First iteration of EMP (formerly outline EMP) produced during the design stage for the preferred option	Produced
Construction (refined for the consented project)	Second iteration of EMP (formerly construction EMP) refined during the construction stage for the consented project, in advance of construction.	Refined
End of construction	Third iteration of EMP (formerly handover EMP) building on the construction EMP refined at the end of the construction stage to support future management and operation.	Refined

Table Source: From Highways England's DMRB LA 120 Table 2.2

4.14.2 Details on the purpose of each iteration of the EMP are provided below:

[14] https://www.standardsforhighways.co.uk/dmrb/search/a3a99422-41d4-4ca1-bd9e-eb89063c7134

- First Iteration of EMP: this will provide preliminary environmental guidance on how to manage the environmental effects of the Scheme. It demonstrates how mitigation measures to reduce environmental impacts during the construction phase will be delivered and how compliance with environmental legislation has been reached.
- Second Iteration of the EMP: this will be fully comprehensive, taking account of detailed design and construction planning. It is maintained and revised during the construction period to take account of any changes in design or external factors such as regulations and standards, any unforeseen circumstances as they arise, such as new protected species or new archaeological finds.
- Third iteration of the EMP: this will be adopted and integrated by the Principal Contractor at the end of the Construction, Commissioning and Handover Stage to support future management and operation.

4.14.3 The EMP will include a Record of Environmental Actions and Commitments (REAC), identifying the environmental commitments that are recommended in the ES (and in accordance with the factors outlined in DMRB LA 104 and DMRB 120), to address the potential environmental effects of the Scheme. The REAC acts in part as a connection between the ES and the Environmental Management Plan in all its forms i.e. iteration 1 - 3 through the lifecycle of a project. It is a live document and as such would be updated as the project progresses and would be finalised at the end of construction on completion of the Scheme, where it would inform the development of, and be included within, the third iteration EMP to support the future management and operation of the Scheme.

4.15 EIA work completed to date

Scoping

4.15.1 On 8 November 2017, in accordance with Regulation 8(1) of the Planning Act 2008, Highways England requested the Planning Inspectorate to provide its opinion on the scope of the information to be included in the ES for the Scheme.

4.15.2 To inform the Planning Inspectorate scoping opinion, an Environmental Scoping Report (ESR)[15] was submitted by Highways England, clearly outlining the intended scope of each environmental topic assessment.

4.15.3 The comments made within the Planning Inspectorate Scoping Opinion and the ongoing surveys and assessment work will be incorporated into the ES assessment of the potential significant environmental effects of the Scheme.

4.15.4 Since the submission of the Scoping Report to the Inspectorate on 8 November 2017, the DMRB environmental standards have been updated. These new standards will be utilised when undertaking the EIA. There have also been a number of design changes made to the Scheme (outlined in Table 3-2), which broadly consist of a reduction in the DCO boundary. A summary of any changes to the EIA methodologies and assessment that result from either the updated DMRB standard or any design changes made since the Scoping Opinion was published will be provided as an appendix to the ES.

[15] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010034/TR010034-000008-TPUP%20-%20Scoping%20Report.pdf

4.15.5 Regulation 14(3)(a) of the EIA Regulations states that where a Scoping Opinion has been adopted, the Applicant's ES should "be based on the most recent scoping opinion adopted (so far as the proposed development remains materially the same as the proposed development which was subject to that opinion)". The Inspectorate expects that there may be some evolution of the methodological approach between the Scoping stage and submission of an application for development consent. As such, it is for the Applicant to demonstrate how an ES submitted as part of an application for development consent meets the requirements of Regulation 14(3)(a).

4.15.6 The current Scheme is not considered to be environmentally different, in terms of predicted effects, to the scheme which was subject to the scoping opinion and therefore it is appropriate to base the ES on the previous scoping opinion. Any subsequent changes in design, scope and assessment methodology since the submission of the Scoping Report for each discipline will be detailed within the ES.

Collation of data

4.15.7 To date, the collation of data for the environmental assessment has included the following:

- Review of desk-based sources including MAGIC http://www.magic.gov.uk/, Environment Agency and local authority websites;
- Site visits to understand the characteristics of the study area by ecologists, cultural heritage specialists, chartered landscape architects and EIA specialists; and
- Ecological surveys comprising an extended Phase 1; condition assessment (biodiversity metric 2.0); passage, wintering and breeding bird; macroinvertebrate; pond; badger; reptiles; water vole; otter; hedgerow; woodland; barn owl and bat.

4.15.8 For the ecological surveys, it was not possible to assess impacts upon roosting bats within buildings. This was due to COVID-19 pandemic restrictions, which did not allow for internal householder inspections and interacting with local residents (via door knocking). Therefore, the existing data set (from previous 2017 surveys with an updated and expanded local records search) will be used to inform the impacts upon roosting bats with mitigation provided on a 'worst case' scenario.

4.15.9 The following consultation has also been undertaken with key stakeholders including meetings, telephone conversations and data requests. A summary of the consultation undertaken to date is presented in Table 4-4 below

Table 4-4 - Consultation Undertaken to Date during the Environmental Assessment Process to date

Consultee	Type and date of consultation	Information requested/issues discussed
Environment Agency	By email –13 October 2017	Request for River Etherow gauging station data records, River Etherow hydraulic model and flood defence data.
	By email – various dates November 2017 to January 2018	Scope of the Flood Risk Assessment has been discussed and agreed including the technical methodologies to be adopted for flood flow estimation and hydraulic modelling of

Consultee	Type and date of consultation	Information requested/issues discussed
		the River Etherow and its tributary the Glossop Brook.
United Utilities	By email – 11 January 2018	Requested information on the operation and maintenance of the Longdendale Reservoir chain and any available reservoir outflow records.
Derbyshire Bat Group	By email - 20 January 2017	Records of bats within a 1km search radius of the Scheme where this search area fell within Derbyshire. Data received 23 January 2017.
Derbyshire Wildlife Trust	By email - 20 January 2017	Protected and notable species records within a 1km search radius of the Scheme where this search area fell within Derbyshire. Data received 23 January 2017.
Greater Manchester Local Record Centre	By email - 23 January 2017	Protected and notable species records within a 1km search radius of the Scheme where this search area fell within Greater Manchester. These records also include bat records for Greater Manchester. Data received 26 January 2017.
Derbyshire & Nottinghamshire Entomological Society	By email - 20 January 2017	Invertebrate species records within a 1km search radius of the Scheme. Data received on 17 February 2017.
Natural England	Telephone - February 2017	Initial conference call to discuss the Scheme and work required.
	Telephone – 8 June 2017	Progress update conference call.
	Telephone – 10 July 2017	Progress update conference call.
	Telephone – 5 September 2017	Progress update conference call.
Natalie Ward (Archaeological Officer) Peak District National Park	By email – 10 January 2018	Request for commencement of consultation for the purpose of checking scope of assessments and expectations of local authorities. Comment on proposed monitoring of GI works was also requested.
Norman Redhead (Archaeological Officer) Greater Manchester Archaeological Advisory Service (GMAAS)	By email – 10 January 2018	Request for commencement of consultation for the purpose of checking scope of assessments and expectations of local authorities. Comment on proposed monitoring of GI works was also requested.
Steve Baker (Archaeological	By email – 10 January 2018	Request for commencement of consultation for the purpose of

Consultee	Type and date of consultation	Information requested/issues discussed
Officer) Derbyshire County Council		checking scope of assessments and expectations of local authorities. Comment on proposed monitoring of GI works Was also requested.
Natalie Ward (Archaeological Officer) Peak District National Park	Telephone – 11January 2018	Response to request for consultation - At present they have no further comments to add above the scoping response. This is due to the Scheme lying largely beyond the Peak District National Park boundary
Norman Redhead (Archaeological Officer) Greater Manchester Archaeological Advisory Service (GMAAS)	Telephone - 16 January 2018	Response to request for consultation - Visit to be arranged at the HER/GMAAS Offices to properly discuss the Scheme, survey requirements, and possible mitigation.
General Public	Public Consultation Event. Saturday 18 March 11:00 – 12:00 Preview 12:00 – 18:00	Public Consultation at Mottram Community Centre.
	Public Consultation Event Wednesday 22 March 11:00 – 12:00 preview 12:00 – 18:00	Public Consultation at Tankersley Welfare Hall.
	Public Consultation Event Friday 24 March 14:00 – 20:00	Public Consultation at Bradbury Community.
	Public Consultation Event Saturday 25 March 11:00 – 19:00	Public Consultation at Tesco Hattersley.
	Public Consultation Event Saturday 1 April 10:00 – 18:00	Public Consultation at St Mary's Church.
Peak District National Park Authority, Natural England, Environment Agency & Historic England	Statutory Environmental Body Meeting No.1 27 June 2016	Introduction to the Scheme and the options.
	Statutory Environmental Body Meeting No.2 24 May 2017	Discussed results from the public consultation.
	Statutory Environmental Body Meeting No.3 25 September 2017	Discussed the Preferred Route Announcement and DCO process.

Consultee	Type and date of consultation	Information requested/issues discussed
Planning Inspectorate Meeting to discuss received scoping opinion	Meeting at The Planning Inspectorate, Bristol – 8 January 2018	Meeting to discuss the received scoping opinion (adopted by the SoS on 19 December 2017).
Norman Redhead (Archaeological Officer) Greater Manchester Archaeological Advisory Service (GMAAS)	Meeting 31 October 2019	Meeting to update GMAAS on the Scheme since previous consultations and to provide input on the archaeology field work proposals
Environment Agency	By email 12 March 2020	To advise on the proposed changes to the River Etherow and get input on these changes
Norman Redhead (Archaeological Officer) Greater Manchester Archaeological Advisory Service (GMAAS)	Meeting via Skype 10 June 2020	To further discuss the archaeology field work proposals
Andy Stubbs (Natural England Advisory) Natural England	Meeting via Skype 4 August 2020	Meeting to update NE on the Scheme since precious consultations, discuss designated sites, species scoped in and out and survey limitations given the Covid-19 situation
Rob Meetham (Landscape specialist) Peak District National Park	By email 21 August 2020	As recommended by Natural England, the Peak District National Park were contacted to review the proposed viewpoints for the LIVA surveys
Natural England Wildlife advisors	By email 29 September 2020	Natural England's Discretionary Advice Service response

4.15.10 Engagement with consultees and collation of additional baseline data will continue as part of the environmental assessment. Consultation will focus upon the assessment of significant environmental effects and appropriate mitigation/enhancement measures. This on-going consultation will be set up in line with COVID-19 consultation best practice approaches, outlined in Section 1.5. This will be under constant review, should government advice about COVID-19 change.

4.16 Competent Experts

4.16.1 In accordance with the EIA Regulations and Highways England guidance, the coordination of the environmental assessment process and inputs into each environmental topic area have been undertaken by a team of competent and qualified specialists. These specialists work in close collaboration with the design engineers responsible for the design of the Scheme, as part of an iterative design, consultation and assessment process. This process maximises the opportunity to avoid or reduce adverse environmental effects at source and to identify mitigation measures to address those effects that cannot be avoided or reduced at source.

5 Air Quality

5.1 Introduction

5.1.1 This chapter provides the preliminary assessment for air quality based on information available as of the end of July 2020. It identifies the air quality study area, methodology, baseline conditions, and potential impacts associated with the Scheme during construction and operation. Where relevant it identifies measures recommended to mitigate any potentially significant adverse effects.

5.2 Study Area

5.2.1 The study area is based on traffic data modelled by Balfour Beatty Atkins for the Preliminary Design stage in 2020.

5.2.2 The Scheme Affected Road Network (ARN) is located within the administrative boundaries of Tameside Metropolitan Borough Council (Tameside MBC) and Stockport Metropolitan Borough Council, both of which are part of Greater Manchester Combined Authority (GMCA); as well as High Peak Borough Council, Barnsley Council, Derbyshire Dales District Council, and Sheffield City Council.

5.2.3 The study area for the air quality assessment has been defined in accordance with the criteria given in the Design Manual for Roads and Bridges (DMRB) LA 105 Air Quality[16] standard.

5.2.4 The air quality study area for assessing potential impacts of construction dust during the construction phase is defined as the area within 200 m of the boundary of the footprint of construction activities.

5.2.5 The air quality study area for the operational phase was defined as the area within 200 m of the roads meeting the traffic screening criteria within DMRB LA 105. The following traffic screening criteria has been applied based on the comparison between 'with Scheme' and 'without Scheme' traffic data as defined in DMRB LA 105:

- Road alignment will change by 5 m or more; or
- Daily traffic flows (two way) will change by 1,000 annual average daily traffic (AADT) or more; or
- Heavy Duty Vehicle (HDV) flows (two way) will change by 200 AADT or more; or
- A change in speed band.

5.2.6 The changes are applied to roads, rather than modelled links, and so where relevant are determined under two-way traffic conditions. The AADT and HDV criteria has been applied to two-way traffic data (i.e. the sum of the carriageways not individual carriageways). The speed band criteria have been applied to both one way and two-way traffic data.

[16] Highways England Design Manual for Roads and Bridges (DMRB) 'LA 105 Air Quality', November 2019. Available online at: https://www.standardsforhighways.co.uk/prod/attachments/10191621-07df-44a3-892e-c1d5c7a28d90. Accessed 2020

5.2.7 The ARN has been determined based on roads meeting the traffic screening criteria and adjoining roads to these that are within 200 m and were included in the traffic model.

5.2.8 A constraints map for the air quality study area has been produced based on the available information up to the end of July 2020 and is shown in Volume 3 Figure 5.1. The constraints map includes: roads meeting the traffic screening criteria, air quality ARN, selected sensitive receptors (human health and ecological), designated ecological site boundaries, Air Quality Management Areas (AQMA) boundaries, Pollution Climate Mapping (PCM) model data links (exceeding or not) and the location of air quality monitoring sites colour coded by concentrations.

5.3 Proposed Assessment Methodology

5.3.1 The air quality assessment of potential effects and the need for mitigation has been undertaken in line with DMRB LA 105 and has consisted of:

- Qualitative assessment of the likely effect on air quality during construction (The construction site boundary and changes in traffic during the construction phase are not currently confirmed, but will be assessed once the information is available);
- Assessment of the likely changes in air pollutant concentrations during operation of the Scheme at selected human health and ecological receptors. The assessment follows the 'detailed' assessment methodology outlined in DMRB guidance, and a dispersion model has been used to estimate NO2 concentration at selected human health receptors and resultant nitrogen deposition at selected ecological receptors in the Scheme opening year (2025);
- Assessment of significance of the air quality effects in the Scheme opening year (2025), including an assessment of compliance with the EU Air Quality Directive; and
- Identification of the need for mitigation measures where appropriate.

5.3.2 The assessment has not taken account of recently updated Department for Environment, Food and Rural Affairs (Defra) air quality assessment tools and datasets (updates released 19th August 2020) and updated Highways England speed band emission rates which account for the August 2020 Defra tools update.

5.3.3 Further details of the assessment methodology are presented in Volume 2 Appendix B.

5.4 Existing Environmental Conditions

5.4.1 Information on existing ambient air quality i.e. baseline conditions, and identification of potential air quality constraints to the Scheme have been determined through reference to the following sources:

- AQMA mapping[17];

[17] DEFRA (2019). AQMA interactive map. [Online]. Available from: http://uk-air.DEFRA.gov.uk/aqma/maps [Assessed July 2020]

- Defra PCM model data (based on a 2018 reference year)[18];
- Local Authority Local Air Quality Management (LAQM) reports including local monitoring data for the local authorities included in the study area[19,20,21,22].
- Highways England Scheme specific air quality monitoring surveys;
- Mapped background pollutant concentrations for the UK available from Defra UK-Air website[23];
- Natural England (NE) Multi-Agency Geographic Information for Countryside (MAGIC) website, to identify boundaries of national and internationally designated ecological sites[24];
- Woodland Trust Ancient Tree Inventory to identify veteran trees[25];
- Local wildlife site data provided by Derbyshire Biological Records Centre (DBRC) and Greater Manchester Records Centre (GMRC) to identify boundaries of locally designated ecological sites;
- Critical loads and habitat type obtained from the Air Pollution Information System (APIS)[26] website; and
- Ordnance Survey base mapping to identify locations of sensitive receptors (residential properties, schools and hospitals).

Planning and Policy Context

Air Quality Criteria

5.4.2 There are two sets of ambient air quality thresholds for the protection of public health: legally binding, mandatory limit values set by the European Union (EU) Directive 2008/50/EC on ambient air quality and cleaner air for Europe; and objectives set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS)[27] which local authorities are required to work towards achieving. Both sets of criteria are implemented in Air Quality Regulations (The Air Quality Standards Regulations 2010 (SI 2010/1001 as amended by 2016/1184)[28] for EU limit values and the Air

[18] DEFRA (2019). UK Ambient Air Quality Interactive Map. [Online]. Available from: http://uk-air.DEFRA.gov.uk/data/gis-mapping [Assessed July 2020]
[19] Greater Manchester Combined Authority, 2019 Annual Status Report, June 2020. Accessed 2020 from: https://www.manchester.gov.uk/downloads/download/4166/air_quality_reports
[20] High Peak Borough Council (2019) 2018 and 2019 Air Quality Annual Status Report, September 2019. Accessed 2020, from https://www.highpeak.gov.uk/media/4583/High-Peak-ASR-2019/pdf/High_Peak_ASR_2019.pdf?m=1569832485487
[21] Barnsley Metropolitan Borough Council, 2019 Annual Status Report, June 2020. Accessed 2020, from: https://www.barnsley.gov.uk/media/14924/air-quality-status-report-2020.pdf
[22] Sheffield City Council, 2018 Annual Status Report, June 2018. Accessed 2020, from: https://www.sheffield.gov.uk/content/dam/sheffield/docs/pollution-and-nuisance/air-pollution/air-quality-management/ASR_England_2018.pdf
[23] https://uk-air.DEFRA.gov.uk/data/laqm-background-maps?year=2017
[24] http://magic.DEFRA.gov.uk/
[25] https://ati.woodlandtrust.org.uk/tree-search/?v=1739585&ml=map&z=13&nwLat=53.10951817906596&nwLng=-0.9179754249781213&seLat=53.07240556032497&seLng=-0.7011671058863245 [Assessed July 2020]
[26] http://www.apis.ac.uk/
[27] DEFRA (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Retrieved 2020, from https://www.gov.uk/government/publications/2010-to-2015-government-policy-environmental-quality/2010-to-2015-government-policy-environmental-quality#appendix-5-international-european-and-national-standards-for-air-quality
[28] The National Archives (2010) The Air Quality Standards Regulations 2010: Retrieved 2020, from http://www.legislation.gov.uk/uksi/2010/1001/contents/made

Quality (England) Regulations (SI 2000/928)[29] as amended (2002/3043)[30] for AQ strategy objectives).

5.4.3 Air quality criteria relevant to the air quality assessment are summarised in Table 5-1. The nitrogen dioxide (NO_2) and particulate matter (PM_{10}, $PM_{2.5}$) are the same criteria for both the EU limit values and the AQS objectives.

Table 5-1 - Relevant Human Health Air Quality Criteria

Pollutant	Criteria
NO^2	1-hour mean concentration should not exceed 200 µg/m^3 more than 18 times a year
	Annual mean concentration should not exceed 40 µg/m^3
PM_{10}	24-hour mean concentration should not exceed 50 µg/m^3 more than 35 times a year
	Annual mean concentration should not exceed 40 µg/m^3
$PM_{2.5}$	Annual mean concentration should not exceed 25 µg/m³

Table Source: DEFRA (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

Ecological Criteria

5.4.4 Critical loads for nitrogen deposition have been set by the United Nations Economic Commission for Europe (UNECE)[31]. A critical load is a quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur, according to present knowledge. Critical loads vary by type of habitat and species and are available from the Air Pollution Information System (APIS) website[26]. The critical load for deposition (eutrophication) is given as a range on the APIS website and is quoted in units of kilograms per hectare per year (kg/ha/year), however the lower value of the critical load range is typically used in assessment.

Dust Deposition

5.4.5 There are no national standards or guidelines for dust deposition currently set for the UK, nor by the European Union or World Health Organisation. Typically, assessments use an indicative threshold for the 'likelihood of complaint' for instance, in residential areas this would be a dust deposition flux (as an average measured over a month using a passive deposition gauge) of 200 mg/m^2/day or greater[32].

Planning Policy and Framework

5.4.6 Volume 2 Appendix A.2 summarises the legislation, regulatory and policy framework applicable to air quality.

[29] The National Archives (2000) The Air Quality (England) Regulations 2000: Retrieved 2020, from http://www.legislation.gov.uk/uksi/2000/928/contents/made
[30] The National Archives (2002) The Air Quality (England) (Amended) Regulations 2002: Retrieved 2020, from http://www.legislation.gov.uk/uksi/2002/3043/contents
[31] UNECE, "Convention on Long-range Transboundary Air Pollution," [Online]. Available from: https://www.unece.org/env/lrtap/welcome.html.html.
[32] Institute of Air Quality Management (IAQM) (2018) Guidance on Monitoring in the Vicinity of Demolition and Construction Sites, October 2018 version 1.1.

Baseline Conditions

Local Air Quality Management

5.4.7 The Greater Manchester AQMA and the Sheffield Citywide AQMA are within the air quality study area. The Greater Manchester AQMA has been jointly designated by local authorities within Greater Manchester and includes areas within the TMBC authority area.

5.4.8 Greater Manchester are progressing implementation of a Clean Air Zone (CAZ) to bring about compliance with EU limit values and the AQS objectives as quickly as possible. This will be a 'category C' CAZ which requires buses, taxis, lorries and vans to meet certain emission standards to drive within the zone. The CAZ will include the area within the TMBC administrative boundary and is due to be implemented in 2021. The boundary of the Greater Manchester CAZ will be in the immediate Scheme area. Sheffield City Council are also due to implement a 'category C' CAZ in 2021. This will cover the area within Sheffield inner ring road which is not within the air quality study area for the Scheme.

5.4.9 In addition, High Peak Borough Council have designated an AQMA in the Tintwistle area and in the Dinting Vale and Glossop area (both High Peak Borough Council AQMAs are not yet included in Defra AQMA GIS datasets). The Tintwistle AQMA is not within the ARN but has been included as it is located between two separate sections of ARN

5.4.10 Details of the AQMAs are provided in Table 5-2 and declared AQMAs shown in Volume 3 Figure 5.1.

Table 5-2 - Description of AQMAs

Local Authority	Name	Air Quality Criteria Exceeded	Description
Sheffield City Council	Sheffield Citywide AQMA	NO_2 annual and hourly mean, PM_{10} 24 hr mean	An area covering entire eastern part of the City containing the major build up areas
Greater Manchester Combined Authority	Greater Manchester AQMA	NO_2 annual mean	A new single AQMA covering all 10 Local Authorities in Greater Manchester
High Peak Borough Council	AQMA No.1 Tintwistle*	NO_2 annual mean	An area encompassing a small number of houses located between the A628 and Old Road.
	Glossop AQMA^	NO_2 annual mean	An area encompassing the properties between the A626 Glossop Road/A57 Dinting Vale Junction and the A57 Dinting Vale/Dinting Lane Junction

Table Source: https://uk-air.DEFRA.gov.uk/aqma/maps/; HPBC, 2018 and 2019 ASR (Sept.2019); HPBC Declaration of an Air Quality Management Area on part of the A57, Dinting Vale, Glossop (December 4, 2019). * indicative boundary included in Volume 3 Figure 5.1.

Defra Pollution Climate Mapping (PCM)

5.4.11 Defra's PCM model outputs are used in annual reporting to the EU regarding compliance with the limit values. This model provides projections of roadside NO_2 concentrations across the UK in the years 2018 to 2030 for the development of the UK plan for tackling roadside nitrogen dioxide concentrations and annual reporting to the EU regarding compliance with the limit values. The modelled roadside concentration comprises a background component together with a roadside increment.

5.4.12 There are a number of PCM links in the study area. As such a compliance risk assessment in accordance with LA 105 was undertaken. Locations of PCM links are shown in Volume 3 Figure 5.1.

5.4.13 Defra PCM mapping indicates that there are no roadside exceedances of the annual mean NO_2 EU limit value in the air quality study area in either the PCM base year of 2018 or the Scheme opening year (2025).

Air Quality Monitoring

5.4.14 Air quality monitoring data from continuous monitoring stations (CMS) and passive diffusion tubes (DT) in the air quality study area are detailed below.

Highways England Air Quality Monitoring

5.4.15 Highways England carried out diffusion tube monitoring in the vicinity of the Scheme covering the period between 10/12/2015 and 13/12/2016 and a 6-month period between 21/06/2016 and 12/12/2016 (Mottram Moor Link Road (MMLR) Survey). In addition, Highways England also carried out a monitoring program using diffusion

tubes between 08/08/2013 and 20/04/2015 at several sites throughout the air quality study area (M60 Junction 24 to Junction 27 survey). Details of the concentrations measured at the sites within the study area of the Scheme are provided in Table 5-3 and the locations are shown in Volume 3 Figure 5.1. The results have been annualised to 2018 for use in the model verification.

Table 5-3 - Highways England Diffusion Tube Monitoring Results (NO_2)

Site ID	X	Y	Survey Year Data Capture	Survey Period Mean (Bias Adjusted) ^(µg/m^3)	2018 Annual Mean* (Annualised) (µg/m^3)
MMLR_001	394961	395192	92%	30.2	25.4
MMLR_002	395291	395256	92%	24.3	21.3
MMLR_003	395526	395405	100%	23.5	20.3
MMLR_006	395369	395062	100%	29.4	25.3
MMLR_007	395621	395230	92%	29.3	25.8
MMLR_008	395724	395310	100%	25.7	22.1
MMLR_009	395907	395310	100%	24.0	20.6
MMLR_010	398357	395315	100%	27.4	23.6
MMLR_011	398235	395274	100%	26.6	22.9
MMLR_012	398900	395503	100%	**47.5**	**40.8**
MMLR_013	399291	395634	100%	**58.9**	**50.7**
MMLR_014	399315	395639	92%	**89.5**	**74.2**
MMLR_015	399305	395625	100%	**69.9**	**60.1**
MMLR_016	399300	395652	92%	**42.6**	35.9
MMLR_017	399206	395915	100%	28.6	24.6
MMLR_018	399192	395948	100%	26.5	22.8
MMLR_019	399691	395821	100%	**41.0**	35.3
MMLR_020	398451	396636	100%	39.1	33.7
MMLR_021	398148	396838	100%	38.4	33.0
MMLR_022	397449	397210	83%	31.3	28.0
MMLR_024	400101	395942	100%	**48.7**	**41.9**
MMLR_025	400364	396006	92%	**59.6**	**50.3**
MMLR_026	400948	395800	75%	**45.1**	**42.0**
MMLR_027	401756	394528	100%	**55.8**	**48.0**
MMLR_029	400683	396288	58%	**49.2**	**45.8**
MMLR_030	401076	396674	92%	30.6	26.8
MMLR_031	401568	397235	83%	38.9	36.8

Site ID	X	Y	Survey Year Data Capture	Survey Period Mean (Bias Adjusted) ^(µg/m^3)	2018 Annual Mean* (Annualised) (µg/m^3)
MMLR_032	401944	397290	100%	39.0	33.6
MMLR_036	400622	395977	83%	20.6	18.9
MMLR_038	417883	401146	8%	20.3	-
MMLR_039	418259	401190	50%	24.2	20.6
MMLR_040	419730	401540	100%	20.1	17.3
MMLR_044	400491	396117	100%	**46.5**	**40.0**
MMLR_045	397842	396691	100%	18.8	16.2
MMLR_046	401550	395144	92%	29.0	25.6
MMLR_047	401258	395132	92%	21.1	19.7
MMLR_048	401109	395390	100%	27.1	23.3
MMLR_049	401023	395672	83%	39.0	33.9
MMLR_050	400744	395788	100%	37.9	32.6
MMLR_051	400495	395917	92%	**47.3**	39.6
MMLR_052	400531	396056	67%	21.4	18.2
MMLR_053	401221	395982	92%	26.7	22.3
MMLR_054	400022	395909	100%	**46.1**	39.7
MMLR_056	399049	396280	100%	15.2	13.1
MMLR_057	399876	395862	100%	**43.3**	37.3
MMLR_062	401235	396999	100%	34.6	29.8
MMLR_063	396071	395454	100%	20.5	17.6
MMLR_064	399412	395739	100%	**75.7**	**65.2**
MMLR_065	398825	396336	100%	29.8	25.7
MMLR_066	419726	401525	100%	16.0	13.7
MMLR_067	400701	395902	100%	18.4	15.8
MMLR_068	401318	397017	92%	20.8	19.4
MMLR_069ABC	399718	395804	83%	**53.5**	**47.6**
MMLR_071	399397	395833	50%	**40.8**	37.7
MMLR_072	399323	395861	50%	**41.0**	37.9
MMLR_073	399652	395814	50%	**59.0**	**54.6**
MMLR_074	399801	395847	33%	39.9	**51.1**
MMLR_075	399923	395856	50%	**61.1**	**56.6**
M60J24J27_016_0813	391583	395509	100%	**46.2**	37.8

Site ID	X	Y	Survey Year Data Capture	Survey Period Mean (Bias Adjusted) ^(µg/m^3)	2018 Annual Mean* (Annualised) (µg/m^3)
M60J24J27_017_0813	390962	395494	100%	31.3	25.6
M60J24J27_018_0813	390822	395597	100%	38.8	31.7
M60J24J27_019_0813	391007	395062	92%	27.0	22.2
^ Survey period mean for MMLR_001 to MMLR_069 calculated for December 2015 to December 2016, Survey period mean for MMLR_071 to MMLR_075 calculated for June 2016 to December 2016, National bias adjustment factor applied = 0.91. *Annualisation Factor = 0.83 – 1.53 depending on data capture; ^Survey period mean for M60J2427 calculated for May 2014 to April 2015, National bias adjustment factor applied =0.83, *Annualisation Factor=0.82 for M60)					
Values in **bold** exceed the AQS objective					

5.4.16 The survey indicates that there are expected to be exceedances of the annual mean NO_2 AQS objective in 2018 adjacent to the A57 through Mottram (MMLR_012 to MMLR_015, MMLR_024, MMLR_064, MMLR_069ABC, MMLR_073 to MMLR_075), at the junction of the A57 Dinting Vale and A626 Glossop Road (Dinting Vale Junction) (MMLR_027), adjacent to the A628 in Hollingworth (MMLR_029) and adjacent to Woolley Lane (MMLR_025 and MMLR_026). The highest annualised 2018 annual mean NO_2 concentration of 74.2 µg/m^3 is located at the junction of the A57 and B6174 in Mottram (MMLR_014).

Highways England Scheme Specific Monitoring Trans-Pennine Upgrade (TPU) Survey

5.4.17 A scheme specific diffusion tube monitoring survey is being undertaken on behalf of Highways England for the period starting from 18/08/2018 (TPU Survey). The survey is ongoing and covers some additional sites. The survey was paused between March 2020 and September 2020 due to COVID-19 restrictions. The monitoring locations are predominantly roadside. Results available to date of the monitoring are shown below in Table 5-4. Survey period means (January 2019 to December 2019) and the 2018 annualised means used for the model verification are presented in Table 5-4.

Table 5-4 - Highways England TPU Diffusion Tube Monitoring Results (NO_2)

Site ID	X	Y	Survey Year Data Capture	Survey Period Mean (Bias Adjusted) ^(mg/m3)	2018 Annual Mean* (Annualised) (mg/m3)
TPU1	401756	394528	100%	**45.1**	**43.0**
TPU16	401764	394507	100%	37.1	35.5
TPU17	401796	394509	83%	**44.0**	**43.5**
TPU20	401823	394503	92%	**43.1**	**41.4**
TPU26	402045	396061	42%	24.0	21.1
TPU27	402269	396002	42%	22.9	19.9
TPU29	400744	395787	25%	32.8	25.9
TPU31	400368	396012	25%	**49.7**	39.0
TPU32	400032	395915	25%	**40.6**	32.2
TPU33	399168	395938	25%	30.6	23.9
TPU34	399415	395741	25%	**59.8**	**47.2**
TPU35	399289	395635	25%	**49.0**	38.9
TPU36	399321	395427	25%	31.2	24.7
TPU38	401656	395107	25%	23.3	18.1
TPU42	401930	394439	25%	34.4	27.4
^ Survey period mean calculated for January 2019 to December 2019. National bias adjustment factor applied = 0.93. *Annualisation Factor = 0.79-0.99 depending on data capture					
Values in **bold** exceed the AQS objective					

5.4.18 The annualised 2018 annual mean exceeds the annual mean AQS objective for NO_2 at the Dinting Vale Junction (TPU1, TPU17 and TPU20) and adjacent to the A57 Mottram Moor (TPU34).

Local Authority Monitoring

5.4.19 Tameside MBC undertakes both automatic and diffusion tube monitoring at locations within the air quality study area. Historical annual mean NO_2 concentrations at CMS and diffusion tube locations within the study area are shown in Table 5-5 and Table 5-6.

Table 5-5 - Annual Mean NO_2 Concentrations at Tameside Monitoring Sites

Site ID	X	Y	Site Type	Annual Mean NO_2 Concentration ($\mu g/m^3$)				
				2015	2016	2017	2018	2019
TAM 1 (CMS)	399719	395804	UT	**54.0**	**49.0**	**44.0**	**43.0**	**40.0**
T 3	391000	395130	UB	30.9	31.9	29.3	28.0	28.5
T 11	400390	396025	UT	**61.1**	**62.8**	**58.4**	**56.7**	**55.1**
T 18	391970	395521	UT	**45.7**	**49.3**	**47.8**	**41.6**	**43.5**
T 19	392477	395506	UT	37.8	39.5	33.1	36.0	37.9
T 20	394610	395102	UT	37.0	**41.8**	39.5	**40.1**	37.1
T 21	400423	395965	UT	**53.4**	**56.1**	**53.8**	**50.9**	**46.8**
T 45, 46 and 47 (TAM 1 co-location)	399719	395805	UT	-	**63.2**	**57.0**	**55.9**	**54.4**
T 48	392699	395731	UT	-	30.1	35.0	30.3	32.8
UT=urban traffic, UB=Urban Background; concentrations have been annualised and bias adjusted where necessary by GMCA.								
Values in **bold** exceed the AQS objective; '-' = monitoring data not available								

Table source: 2018 ASR (Greater Manchester Combined Authority), June 2019. Grid reference for T 3 amended due to error in values reported in ASR.

Table 5-6 - Annual Mean PM10 Concentrations at Tameside CMS

Site ID	X	Y	Site Type	Annual Mean PM10 Concentration (mg/m3)				
				2015	2016	2017	2018	2019
TAM 1 (CMS)	399719	395804	UT	18	18	17	19	18

5.4.20 HPBC undertakes diffusion tube monitoring at 13 locations within the study area (Volume 3, Figure 5.1). The most recent available data recorded at these locations is shown in Table 5-7. 2019 data is not currently available. In 2018 there was one exceedance of the AQS objective for annual mean NO_2 recorded at HP25, located at the Dinting Vale Junction.

Table 5-7 - High Peak Borough Council Diffusion Tube Monitoring Results (NO_2)

Site ID	X	Y	Site Type	Annual Mean NO2 Concentration (mg/m3)				
				2015	2016	2017	2018	2019
HP1	403591	394050	RD	15.1	17.8	22.5	22.9	-
HP14	401111	395390	RD	21.8	20.4	25.8	24.1	-
HP15	401296	396112	RD	-	21.1	26.7	23.7	-
HP16	401221	395993	RD	-	23.6	27.0	25.8	-
HP20	401956	397279	KB	32.0	30.8	38.5	28.4	-
HP24	403794	394089	RD	-	-	-	29.8	-
HP25	401797	394508	RD	-	-	-	**53.6**	-
HP26	401025	395670	RD	-	-	-	34.5	-
HP27	401014	395872	RD	-	-	-	32.7	-
HP28	401272	395970	RD	-	-	-	23.0	-
HP29	401215	396967	RD	-	-	-	30.7	-
HP30	401641	397240	RD	-	-	-	28.3	-
HP31	401876	397261	RD	-	-	-	37.8	-
RD=Roadside, KB=Kerbside; concentrations have been annualised and bias adjusted where necessary by HPBC								
Values in **bold** exceed the AQS objective, '-' indicates that monitoring data is not available								

Table source: 2018 and 2019 ASR (High Peak Borough Council) September 2019

5.5 Other Baseline Information to be Obtained / Surveys to be Undertaken

5.5.1 The Highways England scheme specific TPU survey is ongoing and covers some additional sites. The survey was paused in March 2020 due to Covid-19 restrictions but restarted in September 2020. Any further data available will be presented in the ES.

5.5.2 High Peak Borough Council air quality monitoring data for 2019 are still to be provided by HPBC and will be presented in the ES.

5.5.3 The construction assessment will be completed for the ES once further construction information is available including: the finalised construction footprint, haul road locations, construction traffic flows and details of traffic management measures including diversions.

5.5.4 For the ES the operational assessment will consider the need to take account of the recently updated Defra air quality assessment tools and datasets (updates released 19th August 2020) and the updated to the Highways England speed band emission rates. In additional the ES will consider the need to take account of CAZ proposals.

5.6 Potential Effects and Mitigation Measures

Construction

Dust Emissions

5.6.1 There is the potential for elevated dust deposition and soiling at properties within 200 m of the construction site boundary as a consequence of the works, if dust raising activities are not effectively controlled and mitigated. The level and distribution of dust emissions would vary according to the duration and location of activity, weather conditions, and the effectiveness of suppression measures.

5.6.2 The potential effects of construction dust will be considered further in the ES assessment once further information is available.

Construction Traffic

5.6.3 An increase in vehicle movements is expected to occur during the construction period, associated with the transport of materials, plant and labour to and from site. At this stage, the numbers of expected vehicle movements are not yet known, so cannot be quantitatively assessed. Also, the details of any traffic management or the need to divert existing traffic during the construction phase is not yet known, so no assessment of these changes has been carried out. Any impact would be expected to be less than that during operation and would be temporary. This will be examined further in the ES if required.

Operation

Air Quality – Human Health

5.6.4 Annual mean NO_2 results at receptors which are exceeding the annual mean NO_2 AQS objective in both the without Scheme (Do Minimum (DM)) and with Scheme (Do Something (DS)) are shown in Volume 2 Appendix B.

5.6.5 There are expected to be exceedances of the annual mean NO_2 AQS objective in the opening year 2025 without the Scheme (DM) at 83 human health receptors. The exceedances are located adjacent to the A57 through Mottram, at the Woolley Lane/A57/A628 junction (Woolley Bridge Junction), adjacent to the A628 north of the Woolley Bridge junction and at the Dinting Vale Junction.

5.6.6 Of the 83 receptors exceeding in the DM, 82 receptors have a decrease in annual mean NO_2 concentrations with the Scheme in place, and one receptor has an imperceptible change (i.e. less than 0.4µg/m³). The receptors with a decrease in annual mean concentrations are located adjacent to the A57 in Mottram, at the Woolley Lane Junction and at the Dinting Vale Junction. The decreases in concentrations can in some cases result in concentrations decreasing to below the annual mean NO_2 AQS objective. In other cases, the concentrations decrease but are still above the annual mean NO_2 AQS objective.

5.6.7 The highest annual mean NO_2 concentration in the DM is expected at a receptor located at the junction of the A57 and B6174 in Mottram (R137). The estimated annual mean NO_2 concentrations is 67.3 µg/m^3 in the DM scenario and 45.9 µg/m^3 in the DS scenario. The reduction in concentrations at this receptor with the Scheme

in place is considered to be a 'large decrease'. This is due to a reduction in traffic flow on the A57 through Mottram.

5.6.8 With the Scheme (DS) in the opening year 2025 there are expected to still be exceedances of the annual mean NO_2 AQS objective at 33 receptors. These receptors are located adjacent to the A57 in Mottram, at the Woolley Bridge Junction, adjacent to the A628 and at Dinting Vale Junction. Of the 33 receptors that still exceed in the DS, 32 are expected to have a decrease i.e. an improvement in air quality.

5.6.9 There is one receptor expected to exceed the annual mean NO_2 AQS objective in the DS scenario and to not have a decrease in annual mean concentrations. This receptor (R54) is adjacent to the A628 north of the Woolley Bridge Junction and is expected to have an "imperceptible" change.

5.6.10 In line with Defra's LAQM.TG16 there are expected to be exceedances of the NO_2 1-hour mean AQS objective where concentrations are estimated to be more than 60 µg/m³. Eleven receptors are estimated to have concentrations exceeding 60 µg/m³ in the DM scenario, located at the junction of the A57 and B6174 in Mottram and at the Woolley Bridge Junction. However, there are not expected to be any annual mean NO_2 concentrations greater than 60 µg/m³ in the DS scenario.

5.6.11 The human health receptors informing the significance of effect on air quality provided in Table 5-8. The total number of receptors expected to experience an improvement in air quality is 82 in total. Of those receptors, 67 experience a 'large' decrease in concentrations, 13 a 'medium' decrease, 2 a 'small' decrease.

Table 5-8 - Significance for Human Health

Magnitude of Change in Annual Average NO2 (µg/m3)	Total Receptors with:	
	Worsening of air quality objective already above objective or creation of new exceedance	Improvement of air quality objective already above objective or the removal of an existing exceedance
Large (>4)	0 (0 in total)	67 (67 in total)
Medium (>2)	0 (0 in total)	13 (80 in total)
Small (>0.4)	0 (0 in total)	2 (82 in total)

5.6.12 DMRB LA105 provides guideline bands on the number of properties experiencing worsening and improvement, setting an upper level of likely non-significance and lower level of likely significance. For both worsening and improvement of air quality with a 'large' change, the lower level is set at 1 and upper level at 10 receptors, with a 'medium' change, the lower level is set at 10 and upper level at 30 receptors and with a 'small' change the lower level is set at 30 and upper level at 60 receptors.

5.6.13 With significant 'large' improvements at 67 receptors the criteria for significant improvement is met.

5.6.14 The effects from the Scheme in operation are likely to result in a **significant improvement** for human health, (there are many receptors with significant medium/large improvements, and short term AQS objective exceedances are not expected).

Compliance Risk Assessment

5.6.15 Compliance with the EU Air Quality Directive has been considered using the principles in LA105 where Defra PCM model links coincides with the links included in the air quality study area. Model receptor points were placed at a distance of 4m from roads include in the Defra PCM model (referred to a 4m point validation) to determine whether the project air quality modelling aligns with the Defra PCM model in the Scheme opening year. A comparison was made between the PCM model roadside concentrations and the air quality assessment 4m validation point modelled concentrations. In accordance with DMRB LA105 the comparison uses the project air quality modelling results without the Highways England LTTE6 projection factors applied. The difference between the two models was found to be greater than 10% and therefore the project air quality model has been used to inform the compliance assessment.

5.6.16 There are expected to be exceedances of the annual mean NO_2 EU limit value of 40µg/m^3 in 2025 without the Scheme at qualifying features adjacent to the A57 and A6018 through Mottram. All qualifying feature locations with exceedances in 2025 both with (DS) and without the Scheme (DM) are expected to have a decrease in concentrations with the Scheme (DS) in place and therefore do not affect the compliance risk.

5.6.17 The human health receptor locations included in the air quality assessment across the full study area, including those links not aligning to PCM links, have been included in the compliance risk assessment and there are not expected to be any additional locations away from the PCM model road network which exceed the annual mean NO_2 EU limit value of 40 µg/m^3 in the Scheme opening year with (DS) or without (DM) the Scheme.

Ecological Assessment

5.6.18 DMRB LA 105 provides designated habitat screening criteria for determining the need for further consideration of the impacts of nitrogen deposition. The screening criteria are considered to be exceeded where total nitrogen deposition is greater than the relevant critical load, and the change in nitrogen deposition is greater than 1% of the relevant critical load and is greater than 0.4 kg N/ha/yr (that is, kilograms of nitrogen per hectare per year).

5.6.19 The change in nitrogen deposition rates with the Scheme is expected to be less than the DMRB LA 105 habitat assessment screening criteria at all relevant statutory designated sites (SSSI, SAC, SPA and LNR) and the majority of the non-statutory designated sites. The Scheme is therefore not expected to have a significant effect on the designated habitats within these sites.

5.6.20 There are however changes to nitrogen deposition expected at the following nine non-statutory designated sites that exceed the DMRB LA 105 designated site criteria:

- Ashes Farm Meadows (potential LWS)
- Dark Peak NIA
- Dinting Junction Pond LWS
- Grimbocarandrough Woods Ancient Woodland

- Melandra Castle and Railway LWS
- Peak Forest Canal North SBI
- Shire Hill Ancient Woodland
- Westwood Clough Ancient Woodland
- Westwood Clough & Longlands Hall SBI

5.6.21 In accordance with Figure 2.98 in DMRB LA 105, detailed site investigation is required to determine whether there are species that could be adversely affected by increased nitrogen deposition within these sites.

5.6.22 Work is currently on-going to determine the impacts of the Scheme on these ecological receptors. Following the precautionary principle, there is the potential for significant effects on 'designated habitats' within the nine non-statutory sites. The significance of air quality effects on these nine non-statutory designated habitats will be assessed and presented within the Biodiversity chapter of the ES by a competent expert ecologist.

5.6.23 All other designated site receptors did not meet the screening criteria and in accordance with DMRB LA 105 guidance are **not anticipated to experience any significant impacts** due to the Scheme.

Significant Effects

Construction

5.6.24 Any air quality effects due to construction would be temporary and could be suitably minimised by the application of standard and appropriate mitigation measures. On this basis, there is unlikely to be a significant effect on air quality due to the construction of the Scheme.

Operation

5.6.25 In accordance with DMRB LA 105, the Scheme is not expected to have a significant adverse effect on either human health or impinge on limit value compliance. Ecological sites with statutory designations (SSSI, SAC, SPA and LNR) are not expected to experience significant effects. However, work is still ongoing to establish whether there a risk from changes in air quality associated with the Scheme on ecological receptors within non-statutory designated sites and this will be reported in the ES.

Potential Mitigation Measures

Construction

5.6.26 Mitigation measures to control dust emissions during construction would be included in the Environmental Management Plan (EMP) in accordance with LA 120 prior to construction of the Scheme. The precise measures would depend on the intended construction methods and the potential degree of dust generation at each site. Such measures may include but not necessarily be limited to:

- Regular water-spraying and sweeping of unpaved and paved roads to minimise dust and remove mud and debris;

- Using wheel washes, shaker bars or rotating bristles for vehicles leaving the site where appropriate to minimise the amount of mud and debris deposited on the roads;
- Sheeting vehicles carrying dusty materials to prevent materials being blown from the vehicles whilst travelling;
- Enforcing speed limits for vehicles on unmade surfaces to minimise dust entrainment and dispersion;
- Ensuring any temporary site roads are no wider than necessary to minimise their surface area;
- Damping down of surfaces prior to their being worked; and
- Storing dusty materials away from site boundaries and in appropriate containment (e.g. sheeting, sacks, barrels etc.).

5.6.27 If necessary, monitoring parameters and a programme will be established following completion of the construction dust risk assessment set out in DMRB LA 105.

Operation

5.6.28 The assessment has indicated that there are not expected to be any significant adverse effects with the Scheme for the human health receptors or ecological sites with statutory designations (SSSI, SAC, SPA and LNR), and so mitigation of operational impacts for these receptors is not needed. Work is ongoing to establish whether there a risk from changes in air quality associated with the Scheme on ecological receptors within non-statutory designated sites and this will be reported in the ES.

5.7 Summary

Baseline

5.7.1 The Greater Manchester AQMA and the Sheffield Citywide AQMA are within 200 m of the air quality ARN. This Greater Manchester AQMA has been jointly designated by local authorities within Greater Manchester and includes areas within the Tameside MBC authority area. Greater Manchester are progressing plans to implement a CAZ in 2021, which will include the area within the administrative area of TMBC. High Peak Borough Council have designated AQMAs in the Tintwistle area and the Dinting Vale and Glossop area. The Tintwistle AQMA is not within the air quality ARN but has been referenced as it is located between two separate sections of air quality ARN.

5.7.2 Baseline air quality monitoring data indicates that there are multiple exceedances of the annual mean AQS objective for NO_2 within the air quality ARN (notably adjacent to A57 through Mottram, in Dinting Vale, in Hollingworth and adjacent to Woolley Lane). There are no modelled exceedances of the annual mean NO_2 EU limit value in the Defra PCM model links within the ARN.

Construction

5.7.3 Any air quality effects due to construction would be temporary and could be suitably minimised by the application of standard and appropriate mitigation measures. On

this basis, there is unlikely to be a significant effect on air quality due to the construction of the Scheme.

Operation

5.7.4 In accordance with DMRB LA 105, Table 5-9 outlines the evaluation of air quality significance of the Scheme. It can be seen that the Scheme is not expected to have a significant adverse effect on either human health or ecological receptors with statutory designations (SSSI, SAC, SPA and LNR). Further investigation is being undertaken for ecological receptors within non-statutory designated sites and this will be reported in the ES.

5.7.5 The assessment has not taken account of recently updated Defra air quality assessment tools and datasets (updates released 19th August 2020) and the Highways England speed band emission rates. The ES assessment will consider the need to take account of these changes.

Table 5-9 - Overall Evaluation of Air Quality Significance

Key Criteria Questions	Yes/No
Is there a risk that environmental standards will be breached?	No. There are expected to be exceedances of the annual mean NO_2 AQS objective in the opening year 2025 with and without the Scheme, but there are not predicted to be any new exceedances of the AQS objective with the Scheme in operation.
Will there be a large change in environmental conditions?	Yes. There is expected to be a large decrease in annual mean NO_2 at 67 receptors which exceed the annual mean NO_2 AQS objective.
Will the effect continue for a long time?	n/a
Will many people be affected?	82 residential receptors
Is there a risk that designated sites, areas, or features will be affected?	Ecological receptors are not expected to exceed habitat assessment screening criteria (of both exceeding the critical load for nitrogen deposition and having an increase in nitrogen deposition greater than 1% of the relevant critical load or greater than 0.4 kg N/ha/yr) - at the majority of sites (including all the national and international designated sites and the majority of locally designated sites). However, up to 9 of the non-statutory locally designated sites would need further assessment for the ES assessment by the biodiversity expert following site investigation.
Will it be difficult to avoid or reduce or repair or compensate for the effect?	To be confirmed following evaluation of the air quality impacts on non-statutory designated ecological sites.
On balance is the overall effect significant?	The overall effect is a significant improvement for human health receptors as there are anticipated to be more than 10 receptors experiencing a large decrease in annual mean NO_2 concentration. In accordance with LA105, the effect of the Scheme would be considered a significant improvement. There is not expected to be a risk of compliance with the EU Air Quality Directive. The overall significance of effect for ecological receptors is to be confirmed following further investigation of air quality impacts within

Key Criteria Questions	Yes/No
	non-statutory designated sites. Further assessment for the ES assessment by the biodiversity expert including site investigation, is required.

6 Cultural Heritage

6.1 Introduction

6.1.1 This chapter provides the preliminary assessment for cultural heritage based on information available as of the end of September 2020. It identifies the study areas, methodology, baseline conditions, and potential impacts associated with the Scheme during construction and operation. Where relevant, it identifies high level mitigation measures recommended to mitigate any potentially significant adverse effects which will be refined in the Environmental Statement (ES).

6.1.2 A full assessment of potential impacts on heritage assets, both designated and non-designated, will be presented as part of the ES, with this chapter only presenting the preliminary environmental information and impacts upon the known historic environment within the Scheme boundary and its wider study areas.

6.2 Study Area

6.2.1 Two study areas have been considered as part of the preliminary assessment, comprising:

- A 1 km study area for designated heritage assets
- A 500 m study area for non-designated heritage assets

6.2.2 Designated assets comprise World Heritage Sites, Scheduled Monuments, Listed Buildings, Registered Park and Gardens, Registered Battlefields or Conservation Areas.

6.2.3 Non-designated assets comprise monuments, archaeological sites, buildings, places and landscapes which do not meet the criteria for a designated asset but require consideration under planning due to their heritage significance.

6.2.4 The extent of the study areas are based on professional judgement and in line with DMRB LA 106 Cultural Heritage Assessment[33] standard, which has been designed to account for the sensitivity of the receiving historic environment and the potential impacts of the Scheme. These therefore account for:

- The historical and archaeological context of the Scheme; and
- The setting of statutory designated assets within the Scheme and surrounding landscape: and the potential for heritage assets to survive within the Scheme footprint

6.3 Methodology

6.3.1 The DMRB LA 104 Environmental Assessment and Monitoring[34] provides guidance on the assessment of the value (sensitivity) of receptors, as well as the assessments of magnitude of impact and determination of significance of effect.

6.3.2 The treatment of Cultural Heritage is further discussed in DMRB LA 106, which outlines the methodology specific to heritage.

[33] https://www.standardsforhighways.co.uk/dmrb/search/8c51c51b-579b-405b-b583-9b584e996c80
[34] https://www.standardsforhighways.co.uk/dmrb/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a

6.3.3 The value of a heritage asset is defined by its heritage interest and ability to contribute to local, regional, national and/or international research agendas and frameworks. The guidance provided by DMRB LA 104 lays out the requirements for assessment, as noted below in the descriptions of values are laid out as shown in the table below. Table 6-1 is derived from Table 3-2 Environmental value (sensitivity) and descriptions within DMRB LA104 for the purposes of the Cultural Heritage assessment process.

Table 6-1 - Value (sensitivity) of receptors

Value (sensitivity)	Description (LA 104)	Example
Very High	Very high importance and rarity, international scale and very limited potential for substitution.	Internationally significant heritage assets such as World Heritage Sites, or buildings recognised as being of international importance.
High	High importance and rarity, national scale, and limited potential for substitution.	Nationally important heritage assets generally recognised through designation as being of exceptional interest and value. Grade I and II* Listed Buildings, Grade I and II* Registered Parks and Gardens, Scheduled Monuments, Protected Wreck Sites, Registered Historic Battlefields, Conservation Areas with notable concentrations of heritage assets and non-designated assets of national or international importance.
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution.	Regionally important heritage assets recognised as being of special interest, generally designated. Grade II Listed Buildings, Grade II Registered Parks and Gardens, Conservation Areas and non-designated assets of regional or national importance, including archaeological remains, which relate to regional research objectives or can provide important information relating to particular historic events or trends that are of importance to the region.
Low	Low or medium importance and rarity, local scale.	Assets that are of interest at a local level primarily for the contribution to the local historic environment. Non-designated heritage assets such as locally listed buildings, non-designated archaeological sites, non-designated historic parks and gardens etc. Can also include degraded designated assets that no longer warrant designation.
Negligible	Very low importance and rarity, local scale.	Non-designated features with very limited or no historic interest. Can also include highly degraded designated assets that no longer warrant designation.
Unknown	The importance of an asset has not been ascertained.	

6.3.4 Following the establishment of asset value, the significance of effect on the Cultural Heritage resource is determined by consideration of a combination of the magnitude of the impact and the value of each asset, with professional judgement included in

the determination. The matrix by which significance of effect is determined is demonstrated in Table 3.8.1 of DMRB LA 106 (not reproduced).

6.3.5 The setting of each designated asset will also be assessed, in accordance with Historic England's 'The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning: 3' (2nd edition 2017).

6.3.6 The assessment of setting will be undertaken to identify the level to which the existing setting contributes to each asset's value. The assessment will involve the following steps:

- Identifying the asset and understanding its heritage value;
- Identifying the existing setting and historic setting of the asset, to understand how its setting has changed over time;
- Assessing whether, how and to what degree the existing setting makes a contribution to the value of the heritage asset
- Assessing the impact of the Project on the asset's setting, and the resulting implications for the value of the heritage asset

6.3.7 Heritage assets subject to setting assessments will be identified and presented as part of the ES.

6.4 Existing Environmental Conditions

6.4.1 The information below provides a summary of baseline conditions, as identified during previous phases of assessment for the Scheme, and details information to be obtained during the ES. Detailed topographic and geological information pertinent to the scheme and historic environment are presented in Chapter 9 of the PEIR.

6.4.2 Designated data was obtained from The National Heritage List for England (NHLE) as well as Tameside and Derbyshire Local Authorities (Table C-1 and C-2, Volume 2). This data comprises:

- One Scheduled Monument (HA1);
- Two Conservation Areas (HA2, HA3);
- Two Grade II* Listed Buildings (HA4, HA5); and
- 45 Grade II Listed Buildings (HA6-HA50).

6.4.3 Of these assets, only one, the Mottram Conservation Area is partly located within the DCO boundary.

6.4.4 There are no World Heritages Sites, Registered Battlefields or Registered Parks and Gardens situated within the 1 km Study Area.

6.4.5 In addition to the designated assets identified, the Greater Manchester and Derbyshire Historic Environment Records (HERs) list 94 (HA51- HA144) non-designated heritage assets within the 500 m study area (Table C-2, Volume 2 and Figures 6.1 and 6.2, Volume 3).

6.4.6 Of these non-designated heritage assets nine are located within the DCO boundary.

Archaeological and Historic Background

6.4.7 The following presents a brief chronological summary of both designated and non-designated heritage assets which will be subject to further assessment.

6.4.8 The early prehistoric period within the study area is currently represented by two heritage assets HA51 a Mesolithic flint and chert scatter, at Melandra c. 480 m south of the Scheme and demonstrates occupation of the landscape from the Mesolithic period onwards. In addition to this scatter identified by the Greater Manchester Archaeological Advisory Service (GMAAS) HER, recent excavations at Grange Farm situated at the western extent of the Scheme have recovered multiple lithic scatters and evidence for possible prehistoric occupation. These sites are summarised in the previous archaeological works section below and will be reviewed in detail as part of the ES assessment process.

6.4.9 The Later prehistoric period is represented by HA52, a Bronze Age field system, situated c. 410 m to the north-west of the Scheme, as well as by several isolated Iron Age find spots, represented by carved stone heads of unknown purpose.

6.4.10 Situated c.190m to the south-east of the Scheme, the Melandra Castle Roman fort (Scheduled Monument, HA1) and associated civil settlement occupies a promontory overlooking the River Etherow, with views north-east up the Longdendale valley into the High Peak. The fort's position appears to have been primarily to defend the Pennine frontier, and overlooks the River Etherow, as well as the local Roman road network HA56 &HA57). In addition to the fort and road network, Roman activity is presented by a series of possible Roman enclosures (HA53, HA55 & HA56) within the valley below the fort.

6.4.11 There are no early medieval heritage assets within the 500 m study area, however, it is likely, that many of the settlements situated within the study srea had early medieval origins as suggested by place name evidence. Hollingworth, situated to the north-east of the scheme, derives from the name *holegn worð*, the Old English for holly enclosure indicative of Anglo-Saxon origin.

6.4.12 Medieval activity is represented by possible strip lynchets associated with the evidence for medieval house platforms (HA59) to the south of Mottram, c. 485 m south of the Scheme, as well as the earthworks of the former Mottram Old Mill (HA111), which is reputed to have 13th century origins, situated within the Scheme boundary, to the immediate north. The assets in addition to the Doomsday book references to ploughlands in Tintwistle, Hollingworth, and Mottram, demonstrate evidence for the early development of the landscape during this period.

6.4.13 The historic environment is predominantly represented by both designated and non-designated heritage assets of post medieval date. These comprise HA60 - HA141 and are focused at the settlements of Mottram in Longdendale and Hollingworth. The most prominent of these features is the Grade II* Listed Church of St Michael and All Angels (HA4) and associated assets (HA10, HA11 & HA29), situated c.320m south of the Scheme within the centre of the Mottram in Longdendale Conservation Area (HA2).

6.4.14 The frequency of these post-medieval heritage assets demonstrates the rapid development of the landscape during this period, with extensive evidence for the industrialisation of the region, an increase in intensive agricultural practice and the development of the extractive coal industry visible today. This is evidenced by the

number of post-medieval farms and associated structures across the Scheme and surrounding landscape (HA8, HA18, HA21, HA21, HA27, HA33, HA35-6, HA47, HA65-8 & HA 115), with mills such as Mersey Mill (HA138), Arrowscroft Mill (HA116) and Woolley Bridge Mill (HA140), the Longdendale Aqueduct Mottram Tunnel air shafts, as well as the former sites of Mottram (HA107) and Hague Carr Colliery (HA123) representative of industrial expansion.

6.4.15 Whilst these practices have diminished in importance to the local economy, they have established the footprint and characterisation of the modern settlements present within the Scheme and study areas.

Key sensitive heritage assets

6.4.16 Previous A57 Link Roads assessments have identified the key designated assets listed in Table 6-2, as being particularly sensitive to the development of the Scheme. Following amendments to design, and the continuing assessment process, this list is not exhaustive and does not preclude additional assets being identified or removed. The nature of impact and subsequent effect has not been detailed and will only be given following confirmation of final design.

Table 6-2: Sensitive receptors

Asset ID	Asset	Designation	Value
HA1	Melandra Castle Roman Fort	Scheduled Monument	High
HA2	Mottram-in-Longdendale Conservation Area and associated Listed Structures within this area (HA4, HA5, HA9, HA10-5, HA22-3 HA29, HA32, HA37, HA40, HA44, HA46-50)	Conservation Area	Medium
HA3	Tintwistle Conservation Area	Conservation Area	Medium
HA4	Church of St Michael and All Angels	Grade II* Listed Building	High
HA6	Dial House	Grade II Listed Building	Medium
HA19	Mottram Old Hall (Ivydene)	Grade II Listed Building	Medium
HA24	Lower Roe Cross Farmhouse	Grade II Listed Building	Medium
HA28	Dial Cottage	Grade II Listed Building	Medium
HA36	Woolley Farmhouse	Grade II Listed Building	Medium
HA38	Edge Lane House	Grade II Listed Building	Medium

6.4.17 In addition to the assets listed above, non-designated heritage assets may also be sensitive to the Scheme. These will be detailed in the ES following identification and review as part of the baseline surveys detailed in Section 6.5

Previous Archaeological works

6.4.18 Geophysical Surveys undertaken within the study area in 2000 and 2018, as part of the historically proposed Mottram, Hollingworth, Tintwistle Bypass development, revealed evidence for the Mottram showground, as well as evidence for small scale mineral extraction and 19th century engineering (features associated with the Mottram tunnel), as well as a number of faint positive linear anomalies of possible archaeological origin at the south-eastern extent of the Scheme. A single anomaly indicative of a structure of an unknown date or function is the only feature of possible archaeological interest and is situated to the south of the Scheme adjacent to Mottram.

6.4.19 Archaeological trial trenching was undertaken in 2001 as part of the Preliminary Design stage studies for the Mottram, Hollingworth, Tintwistle Bypass; and undertaken following baseline assessments and the previous geophysical surveys outlined above. These investigations and this revealed limited archaeological remains, with only a demolition spread relating to Mottram Old Mill (HA111) being identified. It was assumed that in most areas investigated, agricultural activity, such as ploughing, may have removed or damaged any archaeological remains.

6.4.20 Additional trenching was undertaken in 2005 at the western extent of the Scheme, as part of the proposed bypass, however, no significant archaeological remains were identified with evidence restricted to evidence for post medieval agricultural activity or associated field drains.

6.4.21 Multiple phases of test pitting have been undertaken at the western extent of the Study Area, with test pitting in 2005 undertaken to inform the Glossop Spur[35] ES, revealing several deposits of archaeological/geoarchaeological interest, including evidence for glaciofluvial activity and 19th century metalworking.

6.4.22 Test pitting and excavations in 2017 and 2019 undertaken at Grange Farm at the western end of the Scheme revealed evidence for historic natural marsh within the area of the A57 roundabout, and extensive modern waterlogging. In addition, evidence for late Mesolithic occupation, including pits, postholes and charcoal have also been identified. This date is further supported by the radiocarbon dating of a hazel nutshell recovered during excavations which returned a date of 7508 BP (Before 1950 AD).

6.5 Other baseline information to be obtained/surveys to be undertaken

Desk Based Assessment

6.5.1 A detailed desk-based assessment (DBA) will be undertaken as part of the ES. This assessment will include a review of NHLE, HER data, including heritage assets and archaeological events data (information derived through surveys), relevant publications and grey literature, including those reports provided by the HER and Archaeological Data Service (ADS), as well as the following desktop surveys:

[35] This refers a previous Scheme proposal within the area. See Section 3.1, Table 3-1 for more information

- ZTV: analysis of a Zone of Theoretical Visibility (ZTV), will be undertaken to assess designated heritage assets within the wider landscape (at a proposed 5km Study Area), and their potential to be affected by the Scheme. Both terrain and surface models for the ZTV will be examined as part of this exercise.
- LiDAR: LiDAR data, as available through the Environment Agency's online resource (https://data.gov.uk/dataset/f0db0249-f17b-4036-9e65-309148c97ce4/national-lidar-programme) where available, will be assessed to identify landscape and earthwork features not identified within the HER.
- Historic Aerial photos: the need for historic aerial photographs will be determined during the desk-based assessment and utilised to fill in gaps within knowledge of the development of the historic landscape where appropriate.
- Hedgerows: identification of hedgerows, which may meet the criteria of ancient under The Hedgerow Regulations 1997 and situated within the Scheme boundary, will be undertaken using available historic and contemporary mapping.

Walkover Surveys

6.5.2 Following the desked based assessment, a walkover survey will be undertaken to ground truth the findings of the desk-based assessment.

6.5.3 This Walkover survey will also review the viewpoints identified by Landscape and Visual, inform setting descriptions, assessments, as well as identify and characterise buildings proposed for demolition as part of the Scheme construction. Photographs of key heritage assets, and viewpoints, taken during this walkover survey will be incorporated into the desk-based assessment.

Consultation

6.5.4 Consultation with key stakeholders will be undertaken throughout the assessment process. These will include:

- Historic England: North West Region;
- Greater Manchester Archaeological Advisory Service (GMAAS);
- Tameside Council's Conservation Officer;
- High Peak Council's Conservation Officer;
- Derbyshire County Council; and
- Peak District National Park Authority.

6.5.5 Additional non-statutory consultees identified during the course of assessment who may have information pertinent to the assessment may also be contacted following agreement from Highway England.

Archaeological fieldwork

6.5.6 Preliminary consultation with GMAAS identified the need for pre-DCO application archaeological investigations within the extent of Tameside Metropolitan Borough. These investigations are required to inform the ES, which in turn will determine the

scope of archaeological mitigation prior to submission of a DCO application for the construction of the Scheme.

6.5.7 Consultation was undertaken on 2nd June 2020 with the Heritage Management Director of GMAAS, where the approach to archaeological investigations was agreed. The results of the archaeological investigations will be used to inform the Scheme ES and the potential need for future mitigation or design consideration.

6.5.8 The archaeological investigations agreed with GMAAS comprise:

- Targeted Geophysical survey to identify areas of alluvium to the east and west of the Scheme. The aims of this survey are to characterise the subsurface geology in areas of alluvium to the east and west of the Scheme;
- Targeted shovel pit surveys, the aims of which are to assess the potential for early prehistoric lithic scatters in areas of pasture at the east and western extents of the Scheme
- Targeted and non-targeted trenching to sample archaeological features identified during previous phases of work associated with the Scheme, as well as the areas of test pitting proposed above. The aims of these investigations are to the validity and accuracy of previous survey results, as well test those areas that appear to be void of known heritage assets.

6.5.9 In addition to the agreed programme of archaeological investigations, the archaeological assessment and monitoring of geotechnical investigations are also likely to be required. The requirement and scope of this will be agreed during stakeholder consultation both during the pre-DCO and Statutory consultation period.

6.6 Potential Effects and Mitigation Measures

Potential Effects

6.6.1 The following potential impacts could occur as a result of the construction and operation of the Scheme:

- Direct physical impacts, potentially comprising the partial or total loss of a heritage asset, including buildings, earthworks or buried archaeological remains; and
- Settings impacts, which could result in non-physical changes to the character and significance of heritage assets as a result of the interruption, or loss of, designed views, the removal of general screening, and changes in air and noise pollution.

Construction

6.6.2 Site clearance and demolition, earthworks and landscaping, road construction, and the construction of proposed overbridges/structures are the likely cause of most direct physical impacts during construction, with temporary supporting infrastructure such as site compounds and haul roads (current locations unknown) also resulting in direct physical impacts.

6.6.3 Setting impacts, on designated heritage assets, are likely to occur due to the introduction of construction plant and machinery, increases in construction traffic, and the loss of screening vegetation.

6.6.4 Whilst direct physical impacts are usually adverse and permanent in nature, potential effects, adverse or otherwise, of construction activities on the setting of heritage assets would be temporary, and reversible.

Operation

6.6.5 During operation the Scheme should have no additional direct physical impacts on the historic environment, however, the setting of heritage assets could be impacted on, and these impacts could potentially be long term and permanent in nature.

6.6.6 Potential effects could be beneficial and/ or adverse, for example: the change in traffic flow could reduce standing traffic, decreasing noise and air pollution and thus beneficial to setting, and the wider historic environment. Conversely the Scheme also has the potential to bring traffic into those areas not previously subject to a primary route resulting in significant negative impact.

6.6.7 Where this occurs, careful mitigation design will seek to reduce impacts.

Mitigation and Compensation Measures

6.6.8 The scheme will be developed through an iterative design process, including involvement of historic environment specialists and consultation with statutory historic environment stakeholders in order to avoid or reduce potential impacts on historic environment assets.

6.6.9 Mitigation measures could include:

- Embedded mitigation through the finalisation of design, such as soft landscaping and sympathetic materials for construction.
- The avoidance of direct impacts, which can be achieved through careful design and management of construction works; and
- The provision of screening during construction to reduce impact to setting for designated assets

6.6.10 Compensation measures could include:

- A programme of building and archaeological investigation in order to compensate for the impacts of the Scheme on affected heritage assets.

Scheme Effects

6.6.11 The assessment of direct impacts on heritage assets requires establishing the value of the affected heritage asset and its sensitivity to change in order to determine potential effects. As this assessment is informed by the surveys and investigations detailed in section 6.4, the assessment of potential effects including residual and cumulative is ongoing, and the final results will be provided in the ES.

6.7 Summary

6.7.1 The PEIR has shown that there is potential for the Scheme to have an adverse effect on both designated and non-designated heritage assets within both Schemes boundary and wider study area, covering archaeology and built heritage.

6.7.2 Further consultation with the statutory consultees and stakeholders, as well as a series of baseline assessments, will be undertaken to inform the EIA process and develop appropriate mitigation strategies and compensation measures where significant impacts are predicted on the historic environment. Any opportunities to mitigate by design will also be considered and discussed with stakeholders.

7 Landscape and visual effects

7.1 Introduction

7.1.1 This chapter provides the preliminary assessment of the potential landscape and visual effects. It describes the methodology, including identification of the study area, the baseline conditions, and the potential impacts of the Scheme on the landscape and visual receptors during construction and operation. It presents mitigation that may be used to mitigate any potential significant effects.

7.1.2 It presents the potential effects at the preliminary design stage and should be read in conjunction with the associated Volume 3 Figures 7.1 and 7.2.

7.2 Study Area

7.2.1 Landscape and visual receptors within a 1 km study area of the Scheme have been identified (Volume 3 Figures 7.1 and 7.2) and a high-level assessment undertaken.

7.2.2 The extent of the study area is considered to be wide enough to enable a good understanding of the contextual landscape character and potential visual receptors and significant effects are not expected beyond 1km.

7.3 Methodology

7.3.1 As a matter of best practice the methodology developed in accordance with guidance set out in the 'Landscape Institute and the Institute of Environmental Management and Assessment Guidelines for Landscape and Visual Impact Assessment' 3rd Edition published by Routledge (2013) (GLVIA3).

7.3.2 The typical criteria for defining the following effects, impacts and sensitivity has been informed and guided by the Design Manual for Roads and Bridges (DMRB) LA 104 Environmental assessment and monitoring[36], and LA 107[37] - Landscape and visual effects and GLVIA3, guidance and tables:

- Classifying Landscape or Visual Effects;
- Evaluating the Magnitude of Landscape Impact Evaluating Landscape Effects;
- Classifying Visual Sensitivity;
- Classifying Magnitude of Visual Impact; and
- Typical Criteria for Evaluating Visual Effects

7.3.3 The methodology is further detailed within Volume 2 Appendix D.

7.3.4 Landscape and visual mitigation will avoid, reduce or offset identified potential effects on receptors and will be set out fully in the landscape and ecological mitigation drawings. It is expected to include embedded mitigation in the form of reduced Scheme footprint and naturalised slope profiling at the design stage.

[36] https://www.standardsforhighways.co.uk/dmrb/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a
[37] https://www.standardsforhighways.co.uk/dmrb/search/bc8a371f-2443-4761-af5d-f37d632c5734

Approach

7.3.5 The desk study has included a detailed review of the information collated for the landscape and visual appraisal. A search for published landscape character assessments (details of which are contained within Section 7.4) and landscape designations on a national, regional and local basis was made using both the MAGIC website and relevant planning policy documents.

7.3.6 Site visits were undertaken during summer 2016 to record views and establish the likely visual influence of the Scheme, and potential visual receptors with a view to it.

7.3.7 Further liaison between the landscape and cultural heritage team has been undertaken to ensure the robustness of the assessment with respect to landscapes of specific historical, cultural and/or archaeological significance are assessed in alignment with DMRB LA 107.

Supporting Figures

7.3.8 The context of the Scheme and information about landscape and visual constraints and opportunities are shown on Volume 3 Figures 7.1. Landscape character is illustrated via a series of photographs from across the study area as shown in Volume 3 Figures 7.3.

7.3.9 Representative viewpoint photographs were taken during the site visits. These are presented as a series of viewpoint locations, representative of the key visual receptors and are illustrative of the visual appraisal. The representative photograph viewpoint locations are shown on the Representative Viewpoints Plan, Volume 3 Figures 7.1, the photos from each representative viewpoint are shown on the Representative Photo Sheets, Sheets 1 to 7 Volume 3 Figures 7.3

Prediction of Effects

7.3.10 Prediction of landscape and visual effects and the appraisal of their significance will be undertaken through the construction phase of the Scheme.

7.3.11 The landscape and visual impact assessment of the operational phase will include the following:

- Prediction of likely landscape and visual effects during the operational phase and the appraisal of their significance. These will be assessed up to 15 years so that consideration of the establishment of any planting mitigation measures can be factored into the assessment;
- An assessment of the sensitivity of the landscape and visual receptors will be undertaken;
- Potential changes to an increase in traffic flow will be considered to inform the assessment;
- Identification of likely significant effect, on the landscape and visual receptor; and
- Inclusion of mitigation measures (if required) to address potential significant adverse landscape and visual effects, and the identification of residual effects.

7.3.12 The assessment criteria are set out in DMRB LA107 and further details can be found in Volume 2 Appendix D.

7.3.13 It should be noted that the categories can be either beneficial or adverse.

7.4 Other information to be obtained/ surveys to be undertaken.

7.4.1 Prior to preparation of the ES, the following will be undertaken:

- A Zone of Theoretical Visibility (ZTV) will be undertaken to inform the potential extent of the Scheme's visibility, and study area in accordance with LA 107;
- Consultation with statutory consultees to agree/select representative viewpoints for consideration;
- Winter and summer visual surveys to capture photography from the agreed representative viewpoints;
- A night-time survey to assess change and effect resulting from the introduction of lighting columns;
- Tree Preservation Order (TPO) information would also be collated from the relevant local planning authorities; and
- The opinions and consensus of the local public and different interest groups, their perception of the landscape, the value they place it and assessment of the change of the project will incur.

Limitations and Assumptions

7.4.2 Viewpoints representing landscape and visual receptors are located in publicly accessible areas and access to private land was not undertaken. In some locations access was not possible. Therefore, some views are assumed.

7.5 Baseline Conditions

7.5.1 At the national level, the Scheme falls entirely within National Character Area (NCA) 54: Manchester Pennine Fringe[38] (NE397, NCA Profile, Natural England, 2012). The NCA covers the transitional zone between the open moorlands of the Dark Peak and Southern Pennines, and the densely populated urban conurbation of Manchester. It is a landscape influenced by the adjacent Pennine moors, and the deeply incised, steep valleys that characterise the transition from moorland to urban area. The elevation of the area is generally between 100 m and 300 m Above Ordnance Datum, between the lower plains and higher Pennine moors.

7.5.2 The Scheme lies within Tameside Metropolitan Borough Council (Tameside MBC), and close to the west boundary of High Peak Borough Council and Derbyshire County Council. The Scheme also lies within the setting of the Peak District National Park (PDNP). As such the Scheme falls across a number of local Landscape Character Area studies, including the Peak District National Park Authority) Landscape Strategy and European Landscape Convention Action Plan (2009)[39], Derbyshire County

[38] http://publications.naturalengland.org.uk/publication/4631438?category=587130
[39] Peak District National Park Landscape Strategy and Action Plan 2009 – 2019

Council's The Landscape Character of Derbyshire (2013)[40], and High Peak Borough Council's High Peak Landscape Character Supplementary Planning Document (2006)[41]. These studies and the relevant landscape character types (LCTs) landscape character areas (LCAs) located within the 1 km study area are presented in Table 7-1.

Table 7-1 - Local Landscape Character Areas

Local Authority & Landscape Character Assessment	Landscape Character Area (LCA)/ Landscape Character Type (LCT)	Description
Peak District National Park Authority; Landscape Strategy and European Convention Action Plan 2009	LCA Dark Peak Western Fringe (DPWF)	Lying on the western edge of the Peak District National Park, described as a sloping and lower lying landscape with, deep and narrow, steep sided cloughs, within this sloping ground, including the Valley Pastures with Industry LCT, Riverside Meadows LCT, and Moorland Slopes & Cloughs LCT.
	DPWF - Valley Pastures with Industry LCT	A low-lying undulating valley topography, with a network of streams wit dense tree cover interspersed between pastoral farmland, with small to medium sized fields enclosed by hedgerows and drystone walls; and dispersed settlement.
	DPWF - Riverside Meadows LCT	A flat alluvial meandering river corridor, with grazing meadows, and dense waterside and scattered hedgerow trees.
Derbyshire County Council; The Landscape Character of Derbyshire (2013)	LCT Riverside Meadows	The Derbyshire landscape characterisation refers to the higher level NCAs and subdivides these into LCTs. The Riverside Meadows LCT is a landscape with fast flowing meandering rivers which form gentle valley floors with narrow flood plains, with low intensity permanent pasture, dense trees cover and a strong sense of enclosure from adjacent slopes.
High Peak Borough Council; High Peak Landscape Character Supplementary Planning Document (2006)	LCT Riverside Meadows	The High Peak landscape characterisation follows a similar approach as the previous Derbyshire work i.e. it refers to the higher level LCAs and sub-divides these into LCTs, therefore the previous description is considered.

7.5.3 Tameside MBC has not prepared a landscape character study and given there is a degree of overlap between the published local character areas, a Scheme specific landscape character study has been prepared and referenced here.

[40] https://www.derbyshire.gov.uk/site-elements/documents/pdf/environment/conservation/landscapecharacter/introduction.pdf#:~:text=The%20Landscape%20Character%20of%20Derbyshire%204%20The%20Landscape,Valley.%20It%20occupies%20a%20unique%20position%20encompassing%20England%27s

[41] https://www.highpeak.gov.uk/media/420/Landscape-Character-SPD-March-2006/pdf/Landscape_SPD_March06.pdf

7.5.4 The study area has been sub-divided into seven homogeneous scheme level character areas (SLCAs) and eleven scheme level townscape character areas (TCAs) based on their physical and cultural elements. Their locations are shown on Scheme Level Landscape Character Areas plan, Volume 3 Figure 7.2 and are presented below in Table 7-2.

Table 7-2 - Scheme Level Character Areas

Scheme Level Landscape/Townscape Character Areas	Description
Landscape	
SLLCA 1: Harrop Edge Valley Pasture	A predominantly undeveloped landscape located west of Mottram in Longdendale and north of Hattersley which is strongly influenced by the surrounding urban edge and M67.
SLLCA 2: Hollingworth Hall Moorland Slopes	A pastoral landscape located on the lower part of the Hollingworth Hall Moor.
SLLCA 3: Mottram Moor Pasture	A pastoral landscape located on the upper part of the Hollingworth Brook Valley. The landscape is defined by pasture fields which are small to medium scale, bordered by hedgerows with scattered tree cover. Semi-natural deciduous woodland slopes are also common features, along the network of local streams and watercourses. Overall, this is an intricate intimate landscape with some distinct local features, a sense of place and few detracting features giving it a high level of tranquillity.
SLLCA 4: Etherow Valley Pasture	A landscape located on the lower slopes of the Etherow Valley between the undeveloped valley floor and the urban A57(T) corridor at Mottram Moor and includes the south east facing slopes at Mottram & Targeton Hill.
SLLCA 5: Etherow Valley Floor with Woodland	A landscape located on the valley floor of the Etherow Valley, containing Woodland groups along and adjacent to the river corridor.
SLLCA 6: Brookfield Valley Floor	A pastoral landscape located along the valley floor of the Glossop Brook containing reservoir water bodies.
SLLCA 7: Swallows Valley with Woodland	A narrow-wooded valley landscape containing Swallows Wood Nature Reserve north west of Arnfield Reservoir and the Hollingworth Brook.
Townscape	
SLTCA 1: South Stalybridge	A townscape area located along the A6108 corridor and its environs, south of Stalybridge.
SLTCA 2: West Mottram and Hattersley	A townscape area encompassing post war ribbon development along the A57(T) Hyde Road and along the B6174 Ashworth Lane, together with the larger planned modern urban residential estate of Hattersley to the south west.
SLTCA 3: Mottram Spout Green	A townscape area encompassing part of Mottram which lies north of the A57(T) including a mix of 19th century ribbon and inter and post war residential development and clusters of modern residential estates interspersed with isolated older buildings.

Scheme Level Landscape/Townscape Character Areas	Description
SLTCA 4: Old Mottram	A part of Mottram which encompasses the high density organic late medieval old village core, which is centred on Market Square and along Church Brow, which climbs up to Warhill.
SLTCA 5: Mottram Moor	A townscape area which links the east part of Mottram, at the junction of the A57(T) and A6018 in the west, to the west part of Hollingworth at the junction of the A57(T) and A628(T) in the east.
SLTCA 6: Wedneshough Green	An area located immediately adjacent to the Mottram Moor TCA to the south and the Hollingworth TCA to the east, encompassing the old village core of Hollingworth, located immediately to north of the junction of the A57(T) and the A628(T)
SLTCA 7: Hollingworth	A townscape area located north of the River Etherow Valley, along the lower Valley sides containing residential development.
SLTCA 8: Gamesley	A townscape area located on the elevated position south of the River Etherow, above the River Etherow Floor.
SLTCA 9: Brookfield Industrial Valley	A townscape area located along Glossop Brook, within the Valley Floor containing Industrial scale- built form.
SLTCA 10: Hadfield	The residential townscape area of Hadfield located on the southern valley side of the River Etherow valley.
SLTCA 11: Etherow Industrial Valley Floor	A townscape area located along the River Etherow, within the Valley Floor containing Industrial scale-built form.

7.5.5 The study area for the Scheme falls within four SLLCAs (SLLCA 1, SLLCA 3, SLLCA 4 & SLLCA 5) and five SLTCAs (SLTCA 2, SLTCA 3, SLTCA 4, SLTCA 5, & SLTCA 10). The landscape is typically considered to be of good quality with some important local landscape feature of high quality. The townscape is typically considered to be of medium quality, although SLTCA 4 Old Mottram and SLTCA 8 Wedneshough Green are considered to be high quality with some recognisable townscape features. Landscape, townscape and visual receptor sensitivity is considered in Volume 2 Appendix D.

7.5.6 With reference to the Lighting Research Centres' work on Light Pollution[42], 2007 this area is considered to predominately fall within Environmental Lighting Zone (ELZ) E2: Areas of low ambient brightness and ELZ E3: Outer urban or rural residential areas, however this would be confirmed during the preparation of the ES.

7.5.7 The study area contains a relatively dense network of public rights of way (PRoW) and recreational routes which include the Trans-Pennine National Trail, National Cycle Route 62, and two regional long-distance paths, Tameside Trail (LON-90) and Etherow-Goyt Valley Way (LON-90). The study area also lies within the setting of the Peak District National Park and greenbelt. A number of Conservation Areas and Listed Buildings are also found within the study area. Please refer to the Cultural Heritage chapter (Chapter 6) for further detail.

[42] https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/LightPollution.pdf

7.5.8 The study area contains a number of residential properties, present as both scattered properties/farmsteads and clusters within the rural areas, and larger settlement groups within the urban areas.

7.5.9 Landscape, townscape and visual receptors are summarised at Volume 2 Appendix D.

7.6 Other baseline information to be obtained/surveys to be undertaken.

7.6.1 Prior to preparation of the ES, the following will be undertaken:

- Refinement of the ZTV to confirm the extent of the Scheme's visibility, and study area in accordance with DMRB LA 107;
- Consultation with statutory consultees to agree/select representative viewpoints for consideration;
- Winter and summer visual surveys to capture photography from the agreed representative viewpoints;
- A night-time survey to confirm baseline environmental lighting zones;
- Tree Preservation Order information would also be collated from the relevant local planning authorities; and
- The opinions and consensus of the local public and different interest groups, their perception of the landscape, the value they place it and assessment of the change of the project will incur.

7.7 Potential Effects and Mitigation Measures

Potential effects

7.7.1 Due to the nature of the Scheme and the characteristics of the study area there will be some landscape and visual effects on the character and visual amenity.

7.7.2 The potential effects of the Scheme during construction and operation and the measures proposed to manage them are outlined as below:

- Table 7-3 Potential effects and mitigation on Landscape and Townscape receptors; and
- Table 7-4 Potential effects and mitigation on Visual receptors.

7.7.3 The tables should be read in conjunction with Volume 3 Figure 7.1 and 7.2.

Table 7-3 Potential effects and mitigation on Landscape and Townscape receptors

Landscape Receptor – SLLCA1: Harrop Edge Valley Pasture			
Nature of Effect	**Sensitivity**	**Magnitude of Effect**	**Significance of Effect**
Nature of Effect During Construction: The receiving landscape would experience the loss of arable agriculture and sections of hedgerow removal, together with diverting/culverting an existing watercourse, and alteration to the existing topography and landform. These rural elements are common to the wider, area resulting in a negative effect. Duration of Effect During Construction: Throughout the construction phase.	– High	– Moderate (Adverse)	– Moderate
Nature of Effect During Operation: The new carriageway would be on low embankment with a section to the east of Old Mill Farm underpass in false cutting, before passing into deep cutting on the approach to the Mottram Underpass entrance as it passes under the A6018. The Scheme and its associated traffic would form a noticeable new feature as it traverses this character area resulting in disruption and loss of existing elements including hedgerows and a section of watercourse, resulting in a negative effect. Duration of Effect During Operation: Severance of the landscape for the lifetime of the Scheme (permanent), with integration as the mitigation establishes (15 years).	– High	– Minor (Adverse)	– Slight
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: New woodland block planting within the wider landscape to integrate with landscape, and infill of existing hedgerows within the wider character area.			
Landscape Receptor – SLLCA 3: Mottram Moor Pasture			
Nature of Effect	**Sensitivity**	**Magnitude of Effect**	**Significance of Effect**
Nature of Effect During Construction: The receiving landscape would experience the loss of existing elements including hedgerows, hedgerow trees, woodland blocks and agricultural land, together with alteration to the existing topography and landform. Of note the loss of the defining woodland feature at the east edge of SLTCA 3: Mottram Spout Green would have a particularly noticeable change resulting in the urban form being more prominent in this relatively enclosed landscape. The activities associated with the excavation of the deep cutting and infilling the steep	– High	– Moderate (Adverse)	– Moderate

sided clough north of SLTCA 5: Mottram Moor within this landscape would create a series of new uncharacteristic conspicuous features. Rural elements which are common to the wider area would be lost in the short term as a result of construction activity, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction phase.			
Nature of Effect During Operation: The Scheme would be in deep cutting as it leaves the eastern Mottram Underpass portal at Mottram Spout Green. The cutting slopes would be located at a central position within this area forming a noticeable new feature. The scale of the cuttings associated disruption and loss of existing landscape elements including hedgerows and watercourses. Of note is the loss of the defining woodland feature at the east edge of SLTCA 3: Mottram Spout Green which would result in the urban form being more prominent in this relatively enclosed landscape resulting in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).	– High	– Minor (Adverse)	– Slight
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: Infill of existing hedgerows and new woodland blocks within the wider character to enhance existing feature.			

Landscape Receptor – SLTCA 3: Mottram Spout Green

Nature of Effect	Sensitivity	Magnitude of Effect	Significance of Effect
Nature of Effect During Construction: The Scheme would require the demolition of a number of residential properties and the loss of the woodland belt at the east edge of this area. As a result, there would be a noticeable change in the scale, layout and intimacy of this townscape. In addition, the activity associated with Mottram Underpass excavation and installation would severe the existing townscape character, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction phase.	– Medium	– Major (Adverse)	– Large
Nature of Effect During Operation: Above the Mottram Underpass, a lack of built form together with the loss of the mature trees along Old Hall Lane at the eastern periphery of this area, including trees which are protected by a Tree	– Medium	– Moderate (Adverse)	– Moderate

Preservation Order, would result in a noticeable change to the character and a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).			
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: New public open space, designed in consultation with the local residents, to integrate the Scheme into the townscape and reduce severance of routes and views.			

Landscape Receptor – SLTCA 5: Mottram Moor

Nature of Effect	Sensitivity	Magnitude of Effect	Significance of Effect
Nature of Effect During Construction: The Scheme would result in the modification of the existing A57(T) corridor, with the construction of a new traffic controlled junction and loss of roadside vegetation. This would be positioned in close proximity to linear groups of residential properties which flank the north side of the existing A57(T). The construction activity would create an uncharacteristic conspicuous feature, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction phase.	– Medium	– Major (Adverse)	– Large
Nature of Effect During Operation: The Scheme would result in the modification of the existing A57(T) infrastructure, as a result of Mottram Moor Junction and associated traffic forming a noticeable feature and creating severance within the townscape area. The introduction of the junction would result in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).	– Medium	– Moderate (Adverse)	– Moderate
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: New hedgerow planting/woodland block planting to the edge of the urban areas to re-establish baseline character, provide screening and integration with the wider landscape.			

Landscape Receptor – SLLCA 4: Etherow Valley Pasture

Nature of Effect	Sensitivity	Magnitude of Effect	Significance of Effect
Nature of Effect During Construction: The receiving landscape would experience loss of arable agriculture, sections of hedgerow including some hedgerow trees, culverting existing	– High	– Moderate (Adverse)	– Moderate

watercourses, and alteration to the existing topography and landform, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction phase.			
Nature of Effect During Operation: The Scheme would be on low embankment with a large section of it in a false cutting. The loss of hedgerows and associated hedgerow trees, along with alteration to the existing topography and landform, would have a noticeable change on the character of this area, resulting in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).	– High	– Minor (Adverse)	– Slight
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: To aid integration of Carrhouse Lane Underpass, the inclusion of vegetation (scrub/woodland) westbound along would be included along with infill of existing hedgerows within the wider character area.			

General Mitigation

7.7.4 In accordance with the guidance set out in GLVIA3 and DMRB LA 107, the principle of embedded mitigation has been adopted so that mitigation has been addressed as an intrinsic part of the assessment process, amending the design wherever possible as part of an iterative process.

7.7.5 Mitigation measures are proposed to be incorporated into the Scheme design to mitigate adverse effects and integrate the Scheme with its setting. These measures should be read in conjunction with Volume 3, Figure 1.1.

7.7.6 No specific mitigation measures have been proposed with respect to the landscape for the construction phase, but 'good construction practices' would be implemented, which would likely include the erection of hoarding around the operational areas of the Site to screen the construction works where possible. The type, colour and design of the hoarding will be agreed with the local authority.

Potential Effects and Mitigation on Receptors

7.7.7 It should be noted that:

- The nature of the receptor given for the landscape and townscape receptors is an initial indication only and would be re-evaluated during the assessment process, and included in the ES, to account for their condition/quality, value and susceptibility to accommodate change;
- Table 7-4 only considers receptors that have the potential to be significantly affected by the Scheme. However, all receptors identified would be considered during the preparation of the ES; and

- The assessment of potential effects is ongoing and is therefore subject to change. Further detailed assessment will be provided within the ES.

Table 7-4 - Potential effects and mitigation on Visual receptors

VR1 - PRoW - LON/46 including Edge Lane, PRoW - LON/50, PRoW - LON/51, and PRoW - LON/52			
Nature of Effect	**Sensitivity**	**Magnitude of Effect**	**Significance of Effect**
Nature of Effect During Construction: Users on the PRoW (within SLLCA 1: Harrop Edge Valley Pasture) would experience sequential views of construction activity, including compounds and storage areas, new night-time light sources, noise and movement of plant. It is considered these activities, albeit being short term in nature, would be noticeable intrusive features visible within. Duration of Effect During Construction: Throughout the construction phase.	– Moderate	– Major	– Large
Nature of Effect During Operation: Users of the PRoW would experience sequential views of the Scheme and associated traffic, comprising the proposed link road and the proposed slip road access to the A6018 forming a noticeable linear feature resulting in a negative effect. Duration of Effect During Operation: Severance of the landscape for the lifetime of the Scheme (permanent), with integration as the mitigation establishes (15 years).	– Moderate	– Moderate	– Moderate
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: New woodland block planting within the wider landscape to integrate with landscape, and infill of existing hedgerows within the wider character area.			
VR2 - Grange Farm & Farmstead on Edge Lane			
Nature of Effect	**Sensitivity**	**Magnitude of Effect**	**Significance of Effect**
Nature of Effect During Construction: The occupiers (within SLLCA 1: Harrop Edge Valley Pasture) would be likely to experience easterly views from lower storey windows to activity in the foreground of the view associated with the Scheme linking into the M67 Junction 4 roundabout. Could potentially include compound and storage areas, new night-time light sources, noise and movement of plant. It is considered these activities, albeit being short term in nature would be noticeable intrusive features visible within the foreground, resulting in a negative effect. Duration of Effect During Construction:	– High	– Major	– Large

Throughout the construction phase.			
Nature of Effect During Operation: The occupier would be likely to experience easterly views from lower storey windows to the Scheme and associated traffic in the foreground comprising the new junction with the M67 and the proposed link road resulting in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).	– High	– Moderate	– Moderate
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: New woodland block planting to integrate within wider landscape, and infill of existing hedgerows within the wider character area.			

VR3 – Cluster of Residential Properties on Edge Lane

Nature of Effect	Sensitivity	Magnitude of Effect	Significance of Effect
Nature of Effect During Construction: The occupier (within SLLCA 1: Harrop Edge Valley Pasture) would be likely to experience south easterly views from lower storey windows to activity of the view associated with Mottram Underpass construction. This could potentially include compounds and storage areas, new night-time light sources, noise and movement of plant. It is considered these activities, albeit being short term in nature would be noticeable features intrusive features visible within the foreground, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction phase.	– High	– Moderate	– Large
Nature of Effect During Operation: The occupiers would be likely to experience south easterly views from lower storey windows to the Scheme and associated traffic with the west Mottram Underpass portal approach beyond resulting in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).	– High	– Minor	– Moderate
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: New woodland block planting to integrate within wider landscape, and infill of existing hedgerows within the wider character area.			

VR4 – Residential Properties on Four Lanes, Ash Close, Meadowcroft and Littlefields

Nature of Effect	Sensitivity	Magnitude of Effect	Significance of Effect
Nature of Effect During Construction: The occupiers to the south of the Scheme (within SLTCA 3: Mottram Spout Green) would be likely to experience northerly views from rear elevation windows to activity in the foreground of the view associated with Mottram Underpass construction and demolition of a number properties, to be confirmed, on Four Lanes. Could potentially include compound and storage areas, new night-time light sources, noise and movement of plant. It is considered these activities, albeit being short term in nature, would be noticeable intrusive features visible within the foreground, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction phase.	– High	– Moderate	– Large
Nature of Effect During Operation: The occupiers, to the south of the Scheme, would be likely to experience northerly views from rear elevation windows to the severed townscape area above Mottram Underpass, and new public open space. The scale and layout of this area would be altered from the baseline situation with the parapet being a noticeable feature, together with the loss of the woodland planting along Old Hall Lane, which will result in an overall negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the woodland mitigation establishes (15 years).	– High	– Minor	– Moderate
Mitigation During Construction: Retain urban vegetation within SLTCA 3: Mottram Spout Green. Mitigation During Operation: Re-introduce new built form within the townscape to reduce severance. It is considered that through integrating a new built form that potential effects from those remaining residential properties will be reduced.			
VR5 – Residential Properties and PRoW - LON/35 along Old Hall Lane			
Nature of Effect	**Sensitivity**	**Magnitude of Effect**	**Significance of Effect**
Nature of Effect During Construction: The occupiers and users of the adjacent PRoW would experience easterly views to activity in the foreground associated with the removal of existing vegetation bounding Old Hall Lane, together with the excavation and installation of Mottram Underpass and demolition of a number of residential properties. This could potentially also include compounds and storage areas, new night-time light sources, noise and movement of plant. It is considered that these activities, albeit being short	– High	– Major	– Very Large

term in nature, would be noticeable intrusive features visible within the foreground, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction phase.			
Nature of Effect During Operation: The occupiers and users of the PRoW would experience easterly views of the Scheme which would be in deep cutting. The cutting and cutting slopes would be a noticeable feature due to the loss of the existing woodland, change in the intimate/enclosure and sense of scale, resulting in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).	– High	– Moderate	– Large
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: Re-location of Old Hall Lane to increase distance between Mottram Underpass portal and integrate further woodland planting above Mottram Underpass portal. New public open space to reduce severance and integrate the proposed Scheme within the townscape.			

VR6 – PRoW – LON/108 Coach Road

Nature of Effect	Sensitivity	Magnitude of Effect	Significance of Effect
Nature of Effect During Construction: Users on the PRoW would experience sequential views of construction activity, including compounds and storage areas, new night-time light sources, noise and movement of plant. These activities would be in the foreground, resulting in disruption to and loss of important landscape features including woodland blocks and field hedgerows. It is considered these activities, albeit being short term in nature, would be noticeable intrusive features visible within the foreground occupying a large proportion of the contained view and resulting in a negative effect. Duration of Effect During Construction: Throughout the construction phase.	– Moderate	– Moderate	– Moderate
Nature of Effect During Operation: Users on the PRoW would experience sequential views of the Scheme in the foreground with the cutting slopes forming a noticeable new feature along with the associated loss of tree cover, particularly where they previously formed the backdrop to the view and replaced by views to the exposed urban form within SLTCA 3: Mottram Spout Green. It is considered, in the long term, that this would result in a negative effect.	– Moderate	– Minor	– Slight

Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).			
Additional Mitigation During Construction: No additional mitigation is considered feasible at this stage. Additional Mitigation During Operation: New woodland planting to replace lost elements along Old Hall Lane adjacent to Mottram Underpass portal, and infill of existing hedgerows within the wider character to enhance existing features.			
VR7 - Residential Properties Along Old Road			
Nature of Effect	**Sensitivity**	**Magnitude of Effect**	**Significance of Effect**
Nature of Effect During Construction: The occupiers would experience views from the front elevation windows of activity in the foreground, associated with the demolition of a number properties on Old Road and Mottram Underpass excavation and installation. This could also potentially include compounds and storage areas, new night-time light sources, noise and movement of plant. It is considered these activities, albeit being short term in nature, would be noticeable features visible within the foreground, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction.	– High	– Major	– Very Large
Nature of Effect During Operation: From Old Road, the views would be focused on the new public open space, with some more open views as a result of the loss of the existing woodland block along Old Hall Lane, which would allow visibility to the Scheme in the new cutting slopes within SLLCA 3: Mottram Moor Pasture, resulting in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).	– High	– Moderate	– Large
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: Re-introduce new built form within the townscape to reduce severance and integrate a new public open space.			
VR8 – Residential Properties along Lodge Court			
Nature of Effect	**Sensitivity**	**Magnitude of Effect**	**Significance of Effect**
Nature of Effect During Construction: The occupiers would be likely to experience easterly views from the upper storey rear windows	– High	– Major	– Large

to construction activity in the foreground associated with the removal of the existing vegetation bounding Old Hall Lane, together with the demolition of properties and activity excavation and installation of Mottram Underpass and the deep cutting within the adjacent SLLCA 3: Mottram Moor Pasture. This would also potentially include the introduction of compound and storage areas, new night-time light sources, noise and movement of plant. It is considered these activities, albeit being short term in nature, would be noticeable intrusive features, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction phase.			
Nature of Effect During Operation: The occupiers would be likely to experience easterly views from their upper storey rear windows to the Scheme which would be present in deep cutting. The cutting slopes would form a noticeable feature as a result of the loss of the adjacent existing woodland block at the edge of SLTCA 3: Mottram Spout Green, resulting in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).	– High	– Moderate	– Moderate
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: Re-location of Old Hall Lane to increase distance between Mottram Underpass portal and integrate further woodland planting above Mottram Underpass portal. Re-introduce new built form within the townscape to reduce severance and integrate a new public open space.			

VR9 – Residential Properties along Tollemache Close

Nature of Effect	Sensitivity	Magnitude of Effect	Significance of Effect
Nature of Effect During Construction: The occupiers would be likely to experience views from the front and rear elevation ground floor and first storey windows of activity in the foreground associated with the demolition of a number properties along Tollemache Close (including garages), and the garages to property associated with Mottram Underpass excavation and installation. It could also potentially include compound and storage areas, new night-time light sources, noise and movement of plant. It is considered these activities, albeit being short term in nature, would be noticeable intrusive features, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction.	– High	– Moderate	– Moderate
Nature of Effect During Operation:	– High	– Minor	– Slight

From Tollemache Close, the views would be predominantly contained by the existing built form which would focus views on the new public open space. Some views however may be more open as a result of the loss of the existing woodland block and built form along Old Hall Lane, which would allow visibility to the Scheme to the eastern edge of SLTCA 3: Mottram Spout Green, resulting in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).			
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: Re-location of Old Hall Lane to increase distance between Mottram Underpass portal and integrate further woodland planting above Mottram Underpass portal. New public open space to reduce severance and integrate the proposed Scheme within the townscape			

VR10 – Nettle Hall and Residential Properties along Coach Road

Nature of Effect	Sensitivity	Magnitude of Effect	Significance of Effect
Nature of Effect During Construction: The occupiers would be likely to experience views from the rear elevation first storey windows of activity in the mid-ground associated with the installation of the adjacent Scheme embankment as it traverses the steep side clough on the north side of SLTCA 5: Mottram Moor. This could also potentially include compound and storage areas, new night-time light sources, noise and movement of plant. It is considered these activities, albeit being short term in nature, would be noticeable intrusive features, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction phase.	– High	– Moderate	– Moderate
Nature of Effect During Operation: The occupiers would be likely to experience views from the rear elevation first storey windows of the Scheme and associated traffic in the mid-ground as it emerges from the deep cutting, although cars would potentially be screened by a new roadside stone faced wall on the approach to Mottram Moor, resulting in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).	– High	– Minor	– Slight
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation:			

A wall at the back of verge with woodland planting to the outward facing side to integrate with the wider landscape and adjacent townscape, and to provide screening from Coach Road. within the steep sided Clough in SLLCA 3: Mottram Moor Pasture as the Scheme emerges from the cutting.

VR11 – Residential Properties along the A57 Mottram Moor Road			
Nature of Effect	**Sensitivity**	**Magnitude of Effect**	**Significance of Effect**
Nature of Effect During Construction: The Scheme would result in the modification of the existing A57(T) corridor, with the construction of a new traffic controlled junction and loss of roadside vegetation. This would be positioned in close proximity to linear groups of residential properties which flank the north side of the existing A57(T). The occupiers would experience views from the front and rear elevation windows of activity in the foreground associated with the demolition of properties Mottram Moor Road and Scheme construction. The construction activity would create an uncharacteristic conspicuous feature, resulting in a negative effect. This could also potentially include compounds and storage areas, new night-time light sources, noise and movement of plant. It is considered these activities, albeit being short term in nature, would be noticeable features visible within the foreground, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction.	– High	– Major	– Very Large
Nature of Effect During Operation: The Scheme would result in the modification of the existing A57(T) infrastructure, with the Mottram Moor Junction and associated traffic forming a noticeable feature and creating severance within the townscape area. The introduction of the junction would result in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).	– High	– Moderate	– Large

VR12 – Carrhouse Lane – ProW LON/88			
Nature of Effect	**Sensitivity**	**Magnitude of Effect**	**Significance of Effect**
Nature of Effect During Construction: Users on the PRoW would experience sequential southerly views of activity in the foreground associated with disruption and loss to important woodland blocks and field hedgerows, the installation of the low embankment and false cuttings. It could also include potential compounds and storage areas, new night-time light sources, noise and movement of plant. It is considered these activities, albeit being short term in nature, would	– Moderate	– Major	– Large

be noticeable intrusive features occupying a large proportion of the view, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction phase.			
Nature of Effect During Operation: Users on the PRoW would experience sequential views of the Scheme in the foreground. The traffic would be mostly screened by the false cutting, although the new landform along with the loss of existing landscape elements including patchy hedgerows, and hedgerow trees would form a noticeable artificial linear feature as it traverses the Etherow Valley floor, occupying a significant proportion of the view, resulting in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).	– Moderate	– Moderate	– Moderate
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: The installation of an Carrhouse Lane Underpass would help integrate the highway with the landscape and help reduce visibility of the Scheme from Carr Lane, as it underpasses the Scheme.			

VR 13 – PRoW LON/87

Nature of Effect	Sensitivity	Magnitude of Effect	Significance of Effect
Nature of Effect During Construction: Users on the PRoW would experience sequential views of activities in the foreground associated with the Scheme on low embankment and associated false cuttings with Mottram Moor Junction as well as disruption and loss of key landscape features including woodland blocks and field hedgerows. The view could also include compound and storage areas, new night-time light sources, noise and movement of plant. It is considered these activities, albeit being short term in nature, would be noticeable intrusive features, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction phase.	– Moderate	– Major	– Large
Nature of Effect During Operation: Users on the PRoW would experience sequential views of the Scheme in the foreground. The traffic would be mostly screened by the false cutting, although the new landform along with the loss of existing landscape elements including patchy hedgerows, and hedgerow trees would form a noticeable artificial linear feature as it traverses the	– Moderate	– Moderate	– Moderate

Etherow Valley floor, occupying a significant proportion of the view, resulting in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).			
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: Infill of existing hedgerows, new hedgerow planting and new woodland block planting to integrate the junction with the wider landscape.			

VR14 – PRoW - LON/86

Nature of Effect	Sensitivity	Magnitude of Effect	Significance of Effect
Nature of Effect During Construction: Users on the PRoW would experience elevated sequential views of activity in the mid- ground associated with the Scheme on low embankment and associated false cuttings, Mottram Moor Junction as well as disruption and loss of key landscape features including woodland blocks and field hedgerows. The view could also include compound and storage areas, new night-time light sources, noise and movement of plant. It is considered these activities, albeit being short term in nature, would be noticeable intrusive features, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction phase.	– Moderate	– Major	– Large
Nature of Effect During Operation: Users on the PRoW would experience elevated sequential views of the Scheme which would create a noticeable feature as it cuts across the pasture moorland slopes of SLLCA 3: Mottram Moor Pasture and traverses the lower slopes and valley floor of SLLCA 4: Etherow Valley Pasture. The traffic and linear engineered earthworks would be clearly visible features along with the loss of landscape elements including hedgerows and hedgerows trees and woodland blocks, resulting in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).	– Moderate	– Moderate	– Moderate
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: Infill of existing hedgerows, new hedgerow planting and new woodland block planting to integrate the junction with the wider landscape.			

VR15 – ProW - LON/90 Etherow – Goyt Valley Way & Tameside Trail			
Nature of Effect	**Sensitivity**	**Magnitude of Effect**	**Significance of Effect**
Nature of Effect During Construction: Users on the PRoW would experience sequential views of the activity in the foreground associated with disruption and loss to important woodland blocks and field hedgerows, the installation of the low embankment and false cuttings. It could also include potential compounds and storage areas, noise and movement of plant. This would occur in the foreground view. It is considered these activities, albeit being short term in nature, would be noticeable intrusive features occupying a large proportion of the view, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction.	– High	– Major	– Large
Nature of Effect During Operation: Users on the PRoW would experience sequential views of the Scheme and its associated traffic (partially visible above the false cutting). The Scheme would create a new noticeable feature as it traverses the River Etherow Valley floor landscape occupying a significant proportion of the open, wide angled view. It would result in the loss of a number of existing landscape elements including the pastoral agricultural land, patchy hedgerows, and hedgerow trees, and a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).	– High	– Moderate	– Moderate
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: Underpass to sympathetically integrate the Scheme in views from the PRoW where it approaches and crosses the Scheme.			
VR16 – Residential Properties along the A57 Brookfield Road			
Nature of Effect	**Sensitivity**	**Magnitude of Effect**	**Significance of Effect**
Nature of Effect During Construction: The occupiers would be likely to experience views from the front elevation ground and first storey windows of activity in the foreground associated with Woolley Bridge Junction and the installation of the bridge over the River Etherow and associated earthworks as well as removal of adjacent vegetation. This could also potentially include compound and storage areas, new night-time light sources, noise and movement of plant. It is considered these activities, albeit being short term	– High	– Major	– Large

in nature, would be noticeable intrusive features, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction phase.			
Nature of Effect During Operation: The occupiers would be likely to experience views from the front elevation ground and first storey windows of the Scheme where it ties in with the A57 with the bridge the River Etherow, the approach earthworks and associated traffic, along with the loss of landscape elements bounding the A57 (hedgerows and hedgerows trees), resulting in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).	– High	– Moderate	– Moderate
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: New hedgerow planting and new woodland block planting to integrate with the wider landscape and replace lost landscape elements.			

VR17 – Tara Brook Farm

Nature of Effect	Sensitivity	Magnitude of Effect	Significance of Effect
Nature of Effect During Construction: The occupiers would be likely to experience southerly views from the front elevation first storey windows of activity in the foreground, associated with the installation of the Scheme earthworks and vegetation removal. The view could also potentially include compound and storage areas, new night-time light sources, noise and movement of plant. It is considered these activities, albeit being short term in nature, would be noticeable intrusive features, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction.	– High	– Moderate	– Moderate
Nature of Effect During Operation: The occupiers would be likely to experience southerly views from the front elevation first storey windows of the Scheme and associated traffic on low embankment. The Scheme would be a clearly visible feature, resulting in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).	– High	– Minor	– Slight
Mitigation During Construction: No additional mitigation is considered feasible at this stage.			

Mitigation During Operation:

Infill of hedgerow planting and new woodland block planting within the wider landscape to integrate and replace lost features and reduce visibility from the receptor.

VR18 – Carrhouse Farm and Meadow View

Nature of Effect	Sensitivity	Magnitude of Effect	Significance of Effect
Nature of Effect During Construction: The occupiers would be likely to experience north westerly views from the first storey windows of activity in the foreground associated with the installation of the Scheme earthworks and vegetation removal. View associated with the highway installation. This could also potentially include temporary compound and storage areas, new night-time light sources, noise and movement of plant, together with the new earthworks and removal of vegetation. It is considered these activities, albeit being short term in nature, would be noticeable intrusive features, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction phase (approximately 3 years).	– High	– Moderate	– Moderate
Nature of Effect During Operation: The occupiers would be likely to experience north westerly views from the first storey windows of the Scheme on embankment. The traffic would mostly be screened by false cutting slopes. The re-location of Carrhouse Lane, together with loss of associated bounding vegetation and new overbridge, would be a noticeable feature, resulting in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).	– High	– Minor	– Slight

Mitigation During Construction:

No additional mitigation is considered feasible at this stage.

Mitigation During Operation:

Infill of hedgerow planting and new woodland block planting within the wider landscape to integrate and replace lost features and reduce visibility from the receptor.

VR19 – PRoW - LON/92 & LON/93

Nature of Effect	Sensitivity	Magnitude of Effect	Significance of Effect
Nature of Effect During Construction: Users on the PRoW would experience sequential northerly foreground views of construction activity in the foreground associated with disruption and loss to important woodland blocks and field hedgerows, the installation of the low embankment and false cuttings. It could also include potential compounds	– Moderate	– Major	– Large

and storage areas, new night-time light sources, noise and movement of plant. It is considered these activities, albeit being short term in nature, would be noticeable intrusive features occupying a large proportion of the view, resulting in a negative effect. Duration of Effect During Construction: Throughout the construction phase.			
Users on the PRoW would experience sequential views of the Scheme in the foreground. The traffic would be mostly screened by the false cutting, although the new landform along with the loss of existing landscape elements including patchy hedgerows, and hedgerow trees would form a noticeable artificial linear feature as it traverses the Etherow Valley floor, occupying a significant proportion of the view, resulting in a negative effect. Duration of Effect During Operation: For the lifetime of the Scheme (permanent), with increased screening and integration as the mitigation establishes (15 years).	– Moderate	– Moderate	– Moderate
Mitigation During Construction: No additional mitigation is considered feasible at this stage. Mitigation During Operation: Infill of hedgerow planting and new woodland block planting within the wider landscape to integrate and replace lost features and reduce visibility from the receptor, screen views from the PRoW where it approaches and crosses the Scheme.			

7.8 Summary

7.8.1 It is considered that through careful and sensitive design, which is in accordance with the relevant guidance, it is likely most impacts can be successfully mitigated and where appropriate, enhancements secured, particularly through additional planting and screening.

7.8.2 It is, therefore, concluded that it is likely that the Scheme may result in moderate residual adverse effects on visual amenity.

7.8.3 It is likely the overall effects on Local Landscape Character are minor to moderate residual and is unlikely to result in any residual adverse effects after mitigation on the wider county and national landscape character.

7.8.4 Further detailed assessment will be provided within the ES.

8 Biodiversity

8.1 Introduction

8.1.1 This chapter provides an assessment as to whether there are likely to be any significant adverse ecological effects on nature conservation resources resulting from the construction and operation of the Scheme and identifies any proposed mitigation measures.

8.1.2 This assessment is based on the preliminary information available at the time of writing the report, and may change as a result of design changes, consultation, and further survey. Further details will be provided within the full Environment Statement (ES).

8.2 Study Area

8.2.1 Baseline data collection has been undertaken at various distances from the Scheme depending on the predicted Ecological Zone of Influence (EZoI) encompassing all of the predicted impacts and potentially adverse effects of the Scheme on individual biodiversity receptors. The EZoI also includes potentially beneficial effects associated with the Scheme as a result of habitat creation and the establishment of new ecological networks.

8.2.2 The study area was based on requirements of the Design Manual for Roads and Bridges (DMRB) LA 108 Biodiversity[43] standard, relevant best practice guidelines[44], environmental assessment documents for European protected sites and professional judgement based on an initial review of aerial imagery, biological records, previous ecological surveys, and existing ecological features. This encompasses any potential off-site ancillary works or areas, construction compounds, haul routes, borrow pits, and temporary land take.

8.2.3 The EZoI was used to inform the extent of the desk study and field surveys. It includes the DCO boundary (including any temporary and permanent works) as shown on Volume 3 Figure 8.1, but due to the relative importance (i.e. the relative geographical scale at which the effect is significant) of some biodiversity resources and the mobility of some species, the study area has been extended from the DCO boundary to obtain information on biodiversity resources at difference spatial extents, as follows:

- 30 km for Special Areas of Conservation (SAC) where bats are noted as a qualifying feature;
- 2 km for statutory and non-statutory designated sites for nature conservation:
  - SACs, candidate SAC (cSAC), and possible SAC (pSAC);
  - Special Protected Areas (SPA) and potential SPAs (pSPA);
  - Wetlands of international importance (Ramsar sites) and proposed Ramsar sites (pRamsar);

[43] DMRB (March 2020). LA 108 Biodiversity. Revision 1. (formerly Volume 11, Section 3, Part 4 Ecology and Nature Conservation and IAN 130/10)
[44] CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.

  - Sites of Special Scientific Interest (SSSI);
  - National Nature Reserves (NNR);
  - Local Nature Reserves (LNR);
  - Sites of Biological Importance (SBI);
  - Local Wildlife Sites (LWS) and potential LWS (pLWS).
- Any European Site that has potential hydrological or hydrogeological linkage to the Scheme with a groundwater dependent terrestrial ecosystem which triggers the criteria for assessment of European sites in accordance with LA 113[45];
- 5 km for records relating to bats and barn owls;
- 1.5 km for structures/ trees which may be used by barn owls;
- 1 km for records relating to protected or species of principal importance as listed on Section 41 of the Natural Environmental and Rural Communities (NERC) Act (hereafter referred to as S41 priority species);
- 500 m for ancient woodland and habitats of principal importance as listed on Section 41 of the NERC Act (hereafter referred to as S41 priority habitats);
- 500 m for water bodies that may potentially be used as breeding sites by great crested newts (GCN);
- 500 m for badger setts;
- 175 m for water bodies and watercourses for their suitability for otters and water voles;
- 150 m for the identification of aquatic habitats (main rivers, ordinary watercourses and standing water bodies) which may be potentially affected by the Scheme. The study area was then extended to 2 km upstream and downstream on the identified main rivers and ordinary watercourses to review background records for watercourse habitats, fish and aquatic macroinvertebrates;
- 50 m for structures/trees which may be used by roosting bats; and,
- 50 m for ancient and veteran trees.

8.2.4 A local record search was obtained from the following sources (with search distances in brackets):

- Derbyshire Bat Group (5 km);
- Derbyshire Biological Records Centre (DBRC) (2 km);
- Greater Manchester Local Record Centre (GMEU) (2 km) & (5 km for bats);
- Derbyshire and Nottinghamshire Entomological Society (1 km); and,
- Pennine Edge Barn Owl Group (5 km).

8.2.5 For species records collected, only those within 10 years of the data collection date have been considered within the assessment.

[45] DMRB LA 113 Road drainage and the water environment, March 2020.

8.2.6 The extent of the EZoI has been reviewed and re-defined throughout the assessment as the preferred options have been selected and from results of the desk study, field surveys and modelling data.

8.3 Methodology

Phase 1 Habitat Survey

8.3.1 An extended Phase 1 habitat survey was undertaken to produce baseline information on habitats within the DCO boundary and, where accessible, adjacent land up to 50 m. The survey comprised a walkover of the land and habitats present, with a classification of the habitats to Phase 1 Habitat Survey standard[46]. The habitats on site were assessed to establish if they contain S41 priority habitats or species.

8.3.2 An additional watercourse walkover survey was undertaken in March 2020 to characterise aquatic habitats within the study area and inform future requirements for targeted aquatic survey e.g. Modular River Physical (MoRPh) survey. Any hedgerows on site were assessed to see if they qualify as an 'important hedgerow' under the Hedgerow Regulations 1997.

Statutory Designated Sites

8.3.3 The Multi-Agency Geographic Information for the Countryside (MAGIC) Map website[47] was reviewed for information regarding statutory designated sites for nature conservation.

Non-statutory Designated Sites

8.3.4 Details of non-statutory designated sites for nature conservation within 2 km of the Scheme were returned from GMEU and DBRC.

Ancient Woodland and Ancient/Veteran Trees

8.3.5 A search of the Ancient Tree Inventory[48] for any ancient or veteran trees within 500 m of the Scheme was undertaken. Areas of ancient woodland were identified using Natural England's ancient woodland inventory[49].

Priority Habitats

8.3.6 A search on the Magic Map website was reviewed for information regarding S41 priority habitats within 500 m of the Scheme.

Other habitats on site (namely watercourses and standing water bodies)

8.3.7 A review of Ordnance Survey (OS) mapping and the Environment Agency (EA) Statutory Main Rivers Map[50] has been undertaken to identify watercourses. Following identification of watercourses, a review of publicly available EA ecological data[51] and

[46] Handbook for Phase 1 Habitat Survey – 'a technique for environmental audit' (Joint Nature Conservation Committee, 2010).
[47] https://magic.defra.gov.uk/
[48] https://data.gov.uk/dataset/9461f463-c363-4309-ae77-fdcd7e9df7d3/ancient-woodland-england
[49] https://data.gov.uk/dataset/9461f463-c363-4309-ae77-fdcd7e9df7d3/ancient-woodland-england
[50] https://www.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386 [Accessed 2 August 2020]
[51] Data obtained from the Environment Agency Ecology and Fish Data Explorer website: https://environment.data.gov.uk/ecology-fish/ [Accessed 1 September 2020]

Water Framework Directive (WFD) classification data[52] was undertaken to inform the baseline for watercourse habitats.

8.3.8 A watercourse and pond walkover survey was undertaken in March 2020 to characterise aquatic habitats within the study area and inform future requirements for targeted aquatic survey e.g. Modular River Physical (MoRPh) survey.

Bats

8.3.9 Due to Covid-19 pandemic restrictions, the existing data set (from previous 2017 surveys with an updated and expanded local records search) will be used to inform the impacts upon roosting bats with mitigation provided on a 'worst case' scenario (i.e. those species/roosts/numbers that have the potential to be impacted by the proposed Scheme).

8.3.10 Bat activity surveys following best practice guidelines[53] were undertaken monthly during the bat survey season in October 2019 and between April-September 2020 with static detector recording five days a month in six locations during suitable weather conditions.

8.3.11 All trees within the study area have subject to a ground level trees assessment. According to their suitability for roosting bats[54], these trees will be subject to either one[55], two, or three tree climbing surveys. These surveys will be undertaken by trained and licensed individuals to determine presence/likely absence of bat roosts. If any trees are deemed suitable for hibernation, additional hibernation surveys will be undertaken between November-January 2020/2021.

Badger

8.3.12 Badger surveys (including scoping surveys and bait marking surveys) were undertaken within the study area between February and April 2020 following best practice guidelines[56/57].

Birds

8.3.13 Breeding bird surveys comprised six visits between April and July 2020 spaced approximately two weeks apart following best practice guidance[58]. Barn owl surveys of suitable structures within 1.5 km were undertaken between June-August 2020, where possible, following best practice guidance[59]. A habitat suitability survey was undertaken for kingfisher along the River Etherow and surrounding watercourses in April 2020.

Otter

[52] WFD classification data obtained from the Environment Agency Catchment Data Explorer website: https://environment.data.gov.uk/catchment-planning/ [Accessed 1 September 2020]
[53] Collins (2016) Bat Surveys for Professional Ecologists Good Practice Guidelines Bat Conservation Trust.
[54] In line with Collins (2016).
[55] Climbing surveys only undertaken on trees with low roosting suitability if unable to have full confidence in a low suitability rating during the ground level tree assessments (i.e. due to not being able to see all features full from the ground).
[56] Harris *et al.,* (1989). Surveying Badgers. The Mammal Society.
[57] DMRB (March 2020). LA 118 Biodiversity design. Revision 0. (formerly LA 118 which superseded HA 59/92, HA 67/93, HA 80/99, HA 81/99, HA 84/01, HA 97/01, HA 98/01, HA 116/05, IAN 116/08, IAN 116/08(W)
[58] Kenneth Williamson & R.C. Homes (1964) Methods and preliminary results of the common birds census, 1962–63, Bird Study, 11:4, 240-256, DOI: 10.1080/00063656409476073
[59] Shawyer CR (2011) Barn owl Survey Methodology and Techniques for use in Ecological Assessment. Wildlife Conservation. Partnership/Barn Owl Conservation Network, Wheathampstead. In press.

8.3.14 Otter surveys were undertaken within the study area in April 2020 and September 2020 on all suitable watercourses within 100 m following best practice guidelines[60].

Water Vole

8.3.15 Water vole surveys were undertaken within the study area in April and September 2020 following best practice guidelines[61].

Consultation

8.3.16 Consultation is currently underway with Natural England with regard to survey effort and scope. Further consultation will be undertaken with environmental organisations, in order to ensure their input is incorporated into the impact assessment, the final design of the Scheme, and its associated mitigation and compensation. These will include (but not be limited to):

- Environment Agency;
- County Ecologists or equivalent;
- Local Wildlife Trusts; and,
- Local nature conservation groups (e.g. local amphibian and reptile groups).

8.3.17 Consultation will continue with these organisations throughout the Preliminary Design stage.

Biodiversity Net Gain

8.3.18 As stated in paragraph 2.17.3, Highways England's Biodiversity Plan require that all schemes included within the RIS should aim to ensure no net loss across Highways England's activities, and where possible, achieve a net gain for biodiversity. The habitats within the DCO boundary have been assessed to obtain a baseline value in order to inform a Biodiversity Net Gain assessment. The Scheme will aim to achieve a net gain for biodiversity, which will be measured and reported using the Defra Biodiversity Metric 2.0.

8.4 Existing Environmental Conditions

8.4.1 A range of ecological studies were undertaken as part of the A57/ A628 Mottram - Tintwistle Bypass scheme and the results of these were presented in a series of reports by Hyder Consulting (UK) Limited (hereafter referred to as 'Hyder') in 2007. Additionally, a range of ecological studies were undertaken as part of the A57 Trans Pennine Upgrade - Mottram Bypass scheme by Arcadis Limited (hereafter referred to as 'Arcadis') in 2017. The information provided within several of these reports has been reviewed and relied on, as part of the desk study.

8.4.2 Each ecological receptor has been prescribed a likely value (sensitivity) in accordance with DMRB LA 104

[60] Chanin P (2003). Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough.
[61] Dean, M., Strachan, R., Gow, D. and Andrews, R. (2006). T*he Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series)*. Eds Fiona Matthews and Paul Chanin. The Mammal Society, London.

Statutory Designated Sites

8.4.3 No European Sites were identified within 2 km and no SACs designated for bats were found within 30 km of the Scheme.

8.4.4 The Scheme does not cross or lie adjacent to, upstream or downstream of, a watercourse which is designated in part or wholly as a European site, nor is it hydrologically or hydrogeologically linked to a European site with a groundwater dependent terrestrial ecosystem.

8.4.5 The Dark Peak SSSI, the Peak District Moors (South Pennine Moors Phase 1) SPA, and the South Pennine Moors SAC share the same boundary situated at its nearest point to the Scheme, approximately 2.2 km north-east, but within 200 m of the ARN. Further details of this assessment are provided in the Air Quality chapter (Chapter 5)

8.4.6 Two statutory designed sites for nature conservation lie within 2 km of the Scheme. These are provided within Table 8-1 and provided in Volume 3 Figure 8.1.

Table 8-1 - Statutory designated sites for nature conservation within 2 km of the Scheme.

Site name and designation	Description	Approximate Distance and direction	Grid Reference
Hurst Clough LNR	Woodland stretching into wildflower meadows where butterflies are common.	345 m south	SJ987943
Great Wood LNR	Most of the trees are oak, but in places there are birch, alder beech and willow that add to the variety. Dead and dying trees are as important as live ones and the dead wood provides food and shelter for spiders, millipedes, beetles and fungi.	1.3 km south	SJ984935

Non-Statutory Designated Sites

8.4.7 There are 31 non-statutory designated sites for nature conservation within 2 km of the Scheme. These are provided within Table 8-2 and Volume 3 Figure 8.1.

Table 8-2 - Non-statutory designated sites for nature conservation within 2 km of the DCO boundary.

Site name and designation	Description	Approximate Distance and direction	Grid Reference
Melandra Castle and Railway LWS	Habitat mosaic	140 m south	SK007949
Hurst Clough SBI	Ancient woodland	360 m south	SJ987941
Clough at Hattersly SBI	Woodland	485 m south-west	SJ977947
Roe Cross Quarry SBI	Upland heathland	500 m north	SJ988966
Westwood Clough and Longlands Hall SBI	Woodland; Plantation woodland	650 m west	SJ972953
Dinting Nature Reserve LWS	Ancient semi-natural ash woodland	680 m south-east	SK015946
Dinting Lodge Grassland LWS	Unimproved neutral grassland	810 m south-east	SK018947
Hollingworth Hall Wood SBI	Ancient woodland; Grassland	850 m north-east	SK007976
Paradise Quarry pLWS	Habitat mosaic	900 m north-east	SK018963
Great Wood SBI	Ancient woodland	930 m south	SJ983935
Wild Bank Hill SBI	Heathland; Birds	950 m north	SJ984980
Dinting Vale Reservoirs and Brook LWS	Standing open water	980 m south-east	SK020944
Hollingworth Reservoir & Swallowswood Nature Reserve LWS	Secondary broad-leaved woodland	980 m north-east	SK009975
Woodland and Grassland at Landslow Green SBI	Woodland; Grassland	1,000 m north-east	SK001971
Robin Wood LWS	Ancient semi-natural woodland - mixed deciduous	1,030 m south	SK005943
Godley Hill SBI	Woodland; Heathland; Grassland	1,060 m west	SJ969950
Banks Wood LWS	Habitat mosaic	1,120 m east	SK023956
Dinting Wood LWS	Ancient semi-natural oak woodland	1,130 m south-east	SK016943
Clough at Madeley SBI	Ancient woodland; Grassland	1,275 m north-west	SJ973962
Dinting Junction Pond LWS	Standing open water	1,290 m south-east	SK022947

Site name and designation	Description	Approximate Distance and direction	Grid Reference
Gamesley Sidings LWS	Habitat mosaic	1,330 m south	SK013940
Brookfold Wood SBI	Ancient woodland; Grassland; Ponds	1,345 m south-west	SJ970944
Eastwood and Acre Clough SBI	Woodland	1,380 m north-west	SJ971974
BackWood SBI	Ancient Woodland	1,475 m south-west	SJ979930
Higher Gamesley Marsh pLWS	Unimproved neutral grassland	1,475 m south-east	SK014939
Warrastfold Bridge Complex LWS	Unimproved acid grassland	1,550 m south	SJ991935
Ashes Farm Meadows pLWS	Unimproved neutral grassland	1,715 m south east	SK026946
Woodseats Wood LWS	Secondary broad-leaved woodland	1,840 m south	SJ989929
North Road Ponds LWS	Standing open water	1,940 m east	SK030952
Pond at Oaklands Hall SBI	Ponds; Amphibians	1,970 m west	SJ962948
Tom Wood LWS	Ancient semi-natural woodland - mixed deciduous	2,200 m south	SJ997931

Ancient Woodland and Ancient/Veteran Trees

8.4.8 No ancient woodland was identified using the Ancient Tree Inventory[62] within 500 m of the Scheme[63].

8.4.9 No veteran or ancient trees were identified using the Ancient Tree Inventory[64] within 500 m of the Scheme.

Priority Habitats

Traditional orchard

8.4.10 One small area of traditional orchard (approximately 0.1 ha), a S41 priority habitat[65], is located immediately adjacent to the DCO boundary north of Mottram Moor Road. A further traditional orchard (0.24 ha) is located adjacent to a farm complex approximately 65 m north-east of the Scheme. Both areas have been classified as priority habitat with low confidence on Magic Map.

[62] https://data.gov.uk/dataset/9461f463-c363-4309-ae77-fdcd7e9df7d3/ancient-woodland-england
[63] Hurts Clough SBI (within 500 m of the Scheme) is designated due to containing ancient woodland, however, the ancient woodland area is located 902 m away from the Scheme at the closest point.
[64] https://ati.woodlandtrust.org.uk/
[65] http://data.jncc.gov.uk/data/2829ce47-1ca5-41e7-bc1a-871c1cc0b3ae/UKBAP-BAPHabitats-56-TraditionalOrchards.pdf

Lowland dry acid grassland

8.4.11 One area of lowland dry acid grassland (approximately 0.5 ha) a S41 priority habitat[66], is located approximately 300 m south of the Scheme. This area has been classified as priority habitat with low confidence on Magic Map.

8.4.12 Within the Scheme, extents of lowland dry acid grassland, a S41 priority habitat, is present in pastural land west of the A6018 Roe Cross Road. Acid indicator species present and abundant include sheep's sorrel, mat-grass and common bent. The grassland community is of the National Vegetation Classification (NVC) type U1 Festuca ovina-Agrostis capillaris-Rumex acetosella grassland, which is characteristic of acidic, free-draining soils. The greatest extent is present on the steep embankment of the A6018 Roe Cross Road, but smaller extents are present on other raised topographical features and earthworks with an acidic and free-draining substrate.

Broadleaved woodland

8.4.13 There are several parcels of broadleaved woodland located within 500 m of the DCO boundary, within which several areas are recognised on the Priority Habitat Inventory[67] as lowland mixed deciduous woodland[68]. One of these areas (approximately 0.3 ha) falls within the DCO boundary to the east of Old Hall Lane. A walkover survey confirmed the presence of the S41 priority habitat lowland mixed deciduous woodland at this location and also either side of a farm track leading to Carrhouse Lane.

8.4.14 Walkover surveys have also identified the presence of small areas of the S41 priority habitat wet woodland[69]. This woodland type, dominated by grey willow, is present within poorly drained hollows within pastural land west of the A6018 Roe Cross Road.

8.4.15 Both sections of woodland are considered to be of county value.

Wood pasture and parkland

8.4.16 It is considered that an area of agriculturally improved grassland with open-grown mature trees to the east of Old Hall Lane, within the Scheme, conforms to the description of the S41 priority habitat wood-pasture and parkland[70].

8.4.17 The presence of open-grown trees, some of which display veteran tree features, set amongst permanent pasture and within in a landscape setting apparently associated with Mottram Old Hall are key features characteristic of wood-pasture and parkland. An Ordnance Survey map of Cheshire, published in 1882, shows that the area is parkland of at least 19th century origin[71].

8.4.18 The wood pasture and parkland is considered to be of county value.

Hedgerows

8.4.19 Hedgerows are frequent throughout the study area predominantly marking field boundaries. Although these hedgerows were mostly gappy, species-poor

[66] http://data.jncc.gov.uk/data/902cafcb-578f-43de-8a99-7143f00d79a2/UKBAP-BAPHabitats-26-LowlandDryAcidGrass.pdf
[67] Section 41 of the Natural Environment and Rural Communities Act 2006.
[68] http://data.jncc.gov.uk/data/2829ce47-1ca5-41e7-bc1a-871c1cc0b3ae/UKBAP-BAPHabitats-30-LowlandMixedDecWood.pdf
[69] http://data.jncc.gov.uk/data/2829ce47-1ca5-41e7-bc1a-871c1cc0b3ae/UKBAP-BAPHabitats-64-WetWoodland.pdf
[70] http://data.jncc.gov.uk/data/2829ce47-1ca5-41e7-bc1a-871c1cc0b3ae/UKBAP-BAPHabitats-65-WoodPastureParkland-2011.pdf
[71] https://maps.nls.uk/view/102340957

(predominantly hawthorn), and heavily managed, they all met the criteria for S41 priority habitat hedgerow[72].

8.4.20 Two hedgerows were assessed to meet the criteria of 'important hedgerow' in accordance with the Hedgerows Regulations 1997. Sections of one of these hedgerows fall within the DCO boundary of the Scheme. The other 'important hedgerow' was situated immediately north-east of the DCO boundary.

8.4.21 The hedgerows are considered to be of local value.

Other habitats on site

Standing water bodies

8.4.22 Standing water bodies include both ponds (< 2 ha) and lakes (> 2 ha)[73].

8.4.23 A total of 22 ponds are situated within the study area, eight of which are located within the DCO boundary. These features vary in terms of size and permanence. No lakes are present within the study area. The standing water bodies on site are considered to be of local value.

Main rivers

8.4.24 Watercourses include both main rivers (as shown on the Environment Agency's Main River Map) and ordinary watercourses (all other watercourses shown on OS mapping which are not classified as main river).

8.4.25 Three main rivers are present within the aquatic habitats study area. These are the River Etherow, Hurstclough Brook and Glossop Brook. The River Etherow and Hurstclough Brook are also located within the DCO boundary.

8.4.26 Approximately 315 m of the River Etherow is situated within the DCO boundary flowing north to south along the eastern edge of the Scheme. The watercourse walkover survey undertaken in March 2020 identified the River Etherow as approximately 10 m wide within the study area. At, and upstream of, the existing A57 crossing, the watercourse is heavily modified with artificial banks limiting marginal vegetation growth and is laterally confined by buildings within the riparian zone. Downstream of the A57, the River Etherow flows into a more open agricultural setting.

8.4.27 Within the study area the River Etherow is split into two WFD surface water bodies:

- Etherow (Woodhead Res. to Glossop Bk.) - GB112069060780 - a Heavily Modified Water Body (HMWB) currently at moderate ecological potential; and
- Etherow (Glossop Bk. To Goyt) - GB112069061050 - currently at poor ecological status.

8.4.28 Glossop Brook is also a main-stem reportable WFD surface water body within the study area, although outside of the DCO boundary:

- Glossop Brook (Long Clough Brook to Etherow) - GB112069060720 – a HMWB currently at moderate ecological potential.

[72] http://data.jncc.gov.uk/data/ca179c55-3e9d-4e95-abd9-4edb2347c3b6/UKBAP-BAPHabitats-17-Hedgerows.pdf
[73] Williams, P., Biggs, J., Thorne, A., Bryant, S., Fox, G. and Nicolet, P., 1999. The Pond Book: a guide to the management and creation of ponds. Ponds Conservation Trust, Oxford.

8.4.29 Hurstclough Brook is located towards the western extent of the Scheme and flows north-east to south-west through the study area towards Hurst Clough LNR (and SBI) and eventually the River Etherow. Hurstclough Brook is classified 'main river' downstream of the existing A57 alignment.

8.4.30 Within the study area Hurstclough Brook flows through agricultural pasture, with riparian vegetation comprising of terrestrial grasses and rushes. The channel has a small wetted width (typically < 1 m) and is comprised of predominantly fine substrates (sand).

Ordinary watercourses (streams and ditches)

8.4.31 There are several ordinary watercourses within the aquatic habitats study area. These are typically field boundary ditches or modified semi-natural surface water flow paths draining hillsides. These ordinary watercourses are predominantly small unnamed tributaries of the River Etherow flowing west to east across the study area.

8.4.32 The ordinary watercourses identified within the study area are located within the Etherow (Woodhead Res. to Glossop Bk.) - GB112069060780 and Etherow (Glossop Bk. To Goyt) - GB112069061050 WFD surface water body catchments.

Other habitats

8.4.33 During the extended Phase 1 habitat survey, the following additional habitats were recorded:

- improved grassland;
- semi-improved grassland;
- neutral grassland;
- orchard;
- dense scrub;
- tall ruderal;
- buildings;
- hardstanding;
- Fence;
- Wall;
- bare-ground; and,
- coniferous plantation woodland.

Species

Bats

8.4.34 Several records of common pipistrelle and pipistrelle species with occasional records of noctule, brown-long eared, Daubenton's, and myotis species were recorded within 5 km of the Scheme from the GMEU, DBRC, and Derbyshire Bat Group.

8.4.35 Bat surveys comprising roost surveys (preliminary roost assessments and emergence/ re-entry surveys) and activity surveys (static monitoring and transect surveys) were undertaken in 2017 by Arcadis. The results of the roost surveys, combined with the desk study information, suggested that there were a number of colonies of common and soprano pipistrelle which move between the buildings within the study area regularly throughout the maternity season and between years.

8.4.36 The updated bat activity surveys recorded a species assemblage typical of the region and included: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule, myotis spp. and brown long-eared bat. Several foraging/commuting routes were identified within the Scheme.

8.4.37 A number of trees within the study area have been identified as having bat roosting potential during ground-based tree assessments (122 trees in total) in 2020.

8.4.38 The assemblage of bats using the Scheme is considered to be of county value.

Badger

8.4.39 A total of 25 badger setts were found within the study area (four main, five annexe, four subsidiary, and 12 outlier setts). Of these, 12 setts are located within the DCO boundary (two main, two annexe, one subsidiary, and seven outlier setts). The four main setts were subject to bait marking surveys, following relevant guidance[74], to establish badger clan territories. The results indicated four badger territories spread across the Scheme.

8.4.40 Widespread badger activity (in the form of sightings and latrines) was also recorded throughout the study area during various field visits in 2020.

8.4.41 The badger population is considered to be of local value.

Birds

8.4.42 Twenty-three species of nature conservation importance[75/76] were observed, which include: black-headed gull, bullfinch, curlew, dipper, dunnock, goosander, grasshopper warbler, grey wagtail, house martin, house sparrow, kestrel, lapwing, lesser black-backed gull, linnet, mistle thrush, reed bunting, snipe, song thrush, starling, stock dove, swift, tawny owl, and willow warbler.

8.4.43 In addition to the above, further species of nature conservation importance, including meadow pipit and skylark have been recorded on site during the 2017 breeding bird

[74] Delahay RJ, Brown JA, Mallinson PJ, Spyvee PD, Handoll D, Rogers LM and Cheeseman C L (2000). The use of marked bait in studies of the territorial organisation of the European badger (*Meles meles*). ***Mammal Review*** **30**: 73-87and HS2 Ecological Surveys: Field Survey Methods and Standards. HS2 2012).
[75] Including S41 species and those listed as a Bird of Conservation Concern https://www.rspb.org.uk/globalassets/downloads/documents/conservation--sustainability/safeguarding/birds-of-conservation-concern-4.pdf
[76] GMEU (2016) Greater Manchester Sites of Biological Importance Selection Guidelines.

surveys by Arcadis. Records of ring ouzel and tree pipit were returned from the data search within 1 km of the Scheme.

8.4.44 Evidence of breeding barn owls was recorded within Grange Farm (approximately 40 m north of the M67 junction 4 roundabout) within a purpose-built barn owl box. A sighting of a foraging barn owl was observed during bat activity surveys in September 2020 within an arable field immediately west of Carrhouse Lane. Surveys are ongoing and full details will be provided within the ES.

8.4.45 Small sections of the riverbank were suitable for kingfisher, however, due to the rapidly changing levels of the River Etherow, lack of sightings, and lack of records, they are considered likely absent.

8.4.46 It is likely that the bird assemblage is of local value.

Otter

8.4.47 No records of otter were returned from the data search within the last ten years.

8.4.48 Otter feeding signs were recorded along the River Etherow at two locations in April 2020. No otter resting sites were recorded. Based on the results of the survey and desktop search, it is likely that otters are using the stretch of the River Etherow within the survey area for commuting, foraging, shelter, and resting. This is broadly similar to the conclusions provided during the 2017 surveys by Arcadis.

8.4.49 Other water bodies within the DCO boundary (i.e. ditches) were considered sub-optimal for otter, however, may occasionally be used for commuting.

8.4.50 It is considered that the otter population is of local value.

Water Vole

8.4.51 No records of water vole were returned from the data search within the last ten years.

8.4.52 Previous surveys in 2017 by Arcadis identified presence of water vole on the River Etherow, and an unnamed watercourse associated with Mottram Moor Farm (outside of the DCO boundary).

8.4.53 Updated surveys in April and September 2020, found no evidence of water vole on any watercourses within the study area including the locations where presence had previously been recorded. It is unclear as to the reasoning for the absence of this species, however, anecdotal evidence of mink (local farmer, pers. comm.) and poor aquatic connectivity to the wider environment may have negatively impacted this species.

8.4.54 It is considered that if still present, the water vole population is of county value.

Fish

8.4.55 The WFD biological quality element for Fish are is classified as being at poor status within the two River Etherow WFD water bodies, and is not assessed within the Glossop Brook (Long Clough Brook to Etherow) water body. The Reasons for Not Achieving Good (RNAG) fish status are suspected to be linked to physical modification resulting in barriers and ecological discontinuity, the presence of invasive signal crayfish and sewage discharge within the watercourse.

8.4.56 Despite being at poor status, fish are still present within these rivers and their current classification contributes to the overall status of each of the water bodies. EA surveys within the DCO boundary (Site ID 6934) indicate that the River Etherow supports a limited number of species, namely brown trout, lamprey species and three-spined stickleback. However, it should be noted that brown trout and the three species of lamprey in the UK are S41 priority species. Lamprey are also listed on Annex II of the Habitats Directive,1992 (as amended). An additional review of data upstream and downstream of the DCO boundary within the wider aquatic habitats study area suggests that the River Etherow supports a broader range of fish, including minnow, stone loach and other coarse fish species.

8.4.57 No EA fish survey records are available for the ordinary watercourses within the study area. The Hurstclough Brook and other ordinary watercourses are considered to be sub-optimal for most fish species within the DCO boundary, although are likely to support small commonly occurring species such as stickleback.

8.4.58 The fish community within the River Etherow is considered to be an important ecological feature given its protection under the WFD and the presence of priority species within the assemblage.

Aquatic macroinvertebrates

8.4.59 Invertebrates are at good status within the WFD water bodies.

8.4.60 Baseline EA data from 2010 to 2018 within the study area (Site ID 67542) identify the River Etherow macroinvertebrate community as indicative of good water quality and slightly sedimented bed conditions. It also indicates that the macroinvertebrate community is highly sensitive to reduced flows.

Priority Species (mammal)

8.4.61 Records of hedgehog and brown hare, which are listed as S41 priority species, were returned from the data search within 1 km of the DCO boundary. The habitats within the study area are broadly suitable for these species and one incidental sighting of brown hare was recorded during the extended Phase 1 habitat survey. No sightings of hedgehog have been recorded during the various surveys, however, hedgehogs are considered likely to be present.

8.4.62 It is considered that priority species (mammals) are of local value.

Common Toad

8.4.63 A single record of common toad, a S41 priority species, was recorded approximately 960 m south-east of the DCO boundary. However, several water bodies within the DCO boundary were recorded as having common toad presence alongside the 2017 GCN surveys by Arcadis, including three ponds were breeding was recorded. The habitats were suitable for foraging, commuting and refuge.

8.4.64 It is considered that the common toad population is of local value.

Receptors to be scoped out of the Assessment

8.4.65 Based on the data obtained to date through desk studies, previous surveys, and updated habitat surveys, it is considered likely that the following species/ species

groups are absent from the study area and are therefore, scoped out of further assessment. Further justification will be provided within the ES.

- White-clawed crayfish: Due to the lack of records and the presence of signal crayfish, this species is considered highly unlikely to be present on site.
- Terrestrial invertebrates: no notable terrestrial invertebrates were recorded during the targeted surveys in 200177, and suitable habitats within the study area are of limited extent, likely only to support an invertebrate assemblage typical of the region, and haven't changed significantly since the original assessment. An updated records search will be undertaken to inform this assessment.
- Protected and notable plants (including fungi): The study area supports a restricted diversity and distribution of protected and notable plants (including fungi), limited to widespread presence of bluebell within woodlands (recorded by Hyder 2007). The habitats have not changed significantly in recent years and no records were returned from the desk study.
- Hazel dormouse: Due to the lack of records and geographical location of the Site, hazel dormouse is considered unlikely to be present on site.
- GCN: No GCN presence was recorded during targeted environmental DNA (eDNA) surveys of all suitable water bodies during 2017 by Arcadis. No new ponds have been constructed or existing ponds changed significantly since the 2017 surveys and no new records have been identified. Subsequently, it is considered unlikely that GCN are present on site.

8.4.66 The additional features below are either present or may be present within the study area; however, due to their local status, low value, and distance from the DCO boundary, significant adverse effects are considered unlikely. Therefore, these features will be scoped out of further assessment:

- Statutory Designated Sites: South Pennine Moors SAC, Peak District SPA, and the Dark Peak SSSI are all located more than 2 km from the Scheme, however, they are located within 200 m of the ARN. Traffic modelling has been undertaken, as outlined within the Air Quality chapter (Chapter 5), which has concluded that there are no ecological receptors within the SAC/ SPA which meet the DMRB LA105 nitrogen deposition screening criteria[78]. Therefore, due to the distance of the designated sites from the Scheme, any impacts have been scoped out of further assessment. Further details will be provided within the Habitats Regulation Assessment (HRA) submitted alongside the ES.

[77] Hyder (2007a). A57/A628 Mottram – Tintwistle Bypass and A628/A616 Route Restraint Measures Environmental Statement. Volume 2A. Report no: 7551- NH50845-NHR-01; 9 February 2007.
[78] DMRB (March 2020). LA 105. Air Quality. Revision 0. (formerly HA 207/07, IAN 170/12, IAN 174/13, IAN 175/13, part of IAN 185/15).

- LNRs: Hurst Clough LNR and Great Wood LNR are situated sufficiently far from the Scheme (approximately 350 m south) and separated by natural and anthropogenic barriers (including major roads, residential properties, and commercial buildings) that it is not considered there will be any direct impact pathways. It should be noted that although Hurst Clough LNR (and SBI) is hydrologically connected to the Scheme (via Hurstclough Brook), the sites are important for non-aquatic receptors (ancient semi-natural woodland habitat, bryophytes, and fungi) that can be safeguarded via standard best practice measures (as outlined within Section 7.6).
- Priority habitats outside of the DCO boundary: traditional orchard and lowland dry acid grassland have been identified within 500 m of the Scheme:
- Lowland dry acid grassland: Due to the nature of the designation, and because this area is situated sufficiently far from the Scheme (approximately 300 m south), it is not considered that there would be any direct impact pathways.
    - Traditional orchard: One small area is currently located within an urban area directly adjacent to Mottram Moor Road and surrounded by residential properties to the east and west. This area has been classified as S41 priority habitat with low confidence and appears to contain typical garden habitat. Due to the urban nature of the site, the location directly adjacent to Mottram Moor, and the site unlikely qualifying as S41 priority habitat, it is not considered that the Scheme would result in any adverse negative impacts and has been scoped out of further assessment. A further area is located approximately 65 m from the Scheme, however, as the area is situated sufficiently far from the Scheme, it is not considered that there would be any direct impact pathways.
- Reptiles: No reptiles were recorded during the targeted surveys in 2017 by Arcadis, and the habitats on the Site have not changed significantly since. Therefore, they are considered unlikely to be present on Site, however, it is considered possible that low numbers of grass snake may occasionally use the site for commuting/foraging. Embedded mitigation can be safeguarded via standard best practice measures as outlined within (Section 7.6).
- Habitats: Improved grassland, semi-improved grassland, neutral grassland, orchard, dense scrub, tall ruderal, buildings, hardstanding, fence, wall, bare-ground, and coniferous plantation woodland have been recorded on site during the updated extended Phase 1 habitat survey. Due to the abundance of these habitats in the wider area and low conservation value, they have been scoped out of further assessment.

8.5 Other Baseline Information to be Obtained/Surveys to be Undertaken

8.5.1 Static bat data has been collected within six locations between October 2019 and September 2020. Tree climbing surveys are being undertaken in July/September 2020. This data will be analysed and will inform the mitigation strategy; full details will be presented within the ES.

8.5.2 Barn owl surveys are being undertaken in September 2020 of suitable structures and trees within 1.5 km of the DCO boundary. Bird territory mapping analysis is currently being undertaken; full results will be provided within the ES

8.5.3 Predictive SYstem for Multimetrics (PSYM) [79] surveys have been undertaken in August 2020 to provide baseline information to inform the assessment of resource importance for those ponds potentially impacted by the Scheme. The results of these surveys are not currently available but will be detailed within the ES. These surveys will also inform a review as to whether any ponds within the study area meet the criteria for S41 priority habitat ponds[80].

8.5.4 MoRPh surveys on the River Etherow and Hurstclough Brook are scheduled for autumn 2020 to provide information on habitat condition. These surveys along with aquatic species data will inform an assessment of whether these watercourses meet the criteria for S41 priority habitat rivers within the ES.

8.5.5 Aquatic macroinvertebrate surveys on the River Etherow, Hurstclough Brook and an unnamed tributary of the River Etherow are scheduled for autumn 2020 and spring 2021. A full review of taxa and biological metrics from the autumn surveys will be reported within the ES.

8.6 Potential Effects and Mitigation Measures

8.6.1 The potential effects of the Scheme during construction and operation and the measures proposed to manage them are outlined below. It should be noted that assessment of potential effects is ongoing and is therefore subject to change. Further detailed assessment will be provided within the ES.

8.6.2 The construction phase is anticipated to be approximately two years with the operational phase being permanent.

Embedded mitigation

8.6.3 Impacts during construction would be controlled through strict adherence to the Environmental Management Plan (EMP)[81] that would be developed using best practice techniques but also a suite of bespoke control measures such as avoidance/minimisation of lighting from sensitive construction areas and (if the project programme allows) scheduling the most disruptive works to avoid sensitive periods for specific species/species groups (i.e. the core bird breeding season). Other measures managed by the EMP would include:

[79] Horwood, S., 2002. A guide to monitoring the ecological quality of ponds and canals using PSYM. Environment Agency, 1-14.
[80] http://data.jncc.gov.uk/data/dec49c52-a86c-4483-90f2-f43957e560bb/UKBAP-BAPHabitats-42-Ponds.pdf
[81] https://www.standardsforhighways.co.uk/dmrb/search/a3a99422-41d4-4ca1-bd9e-eb89063c7134 LA 120 Environmental management plans.

- All site works would be carried out in accordance with environmental working practices to ensure adequate pollution control measures are implemented during construction with monitoring to ensure their effectiveness. Pollution Prevention Guidelines[82] (PPGs) and Guidance for Pollution Prevention Guidelines[83] (GPPGs) will be adhered to at all times. Spill kits would be available on site and potential polluting materials would not be stored within 10 m of watercourses or areas of significant biodiversity value;
- All trenches and work excavations would either be backfilled or covered overnight to prevent entrapment. If this is not possible, ramp(s) would be included to allow any trapped wildlife a means of escape;
- Short term construction airborne pollution resulting from site vehicle emissions and dust would be controlled through best practice measures such as wetting or placing a covering over the site materials, if dictated by very dry weather conditions;
- Site staff/contractors will be given a pre-works toolbox talk by an Ecological Clerk of Works (ECoW) prior to works which have the potential to impact on ecological receptors;
- Clearly demarcated, dedicated access routes would be provided during construction and, where possible, any areas required for temporary works would be reinstated on completion; and,
- Where tree surgery to the crown or roots is necessary, this will be undertaken in accordance with best practice[84]. Retained trees will be adequately protected throughout construction[85].

8.6.4 The requirement for lighting during construction and operation is discussed in Chapter 2, Section 2.8. Lighting of the Scheme would be designed to minimise light spill and would be restricted to areas where the construction site or carriageway needs to be lit for health and safety reasons. Lighting levels and uniformity of light would be maintained to a minimum to reduce errant light and energy usage. Light spill from temporary lighting at construction compounds and at other locations would be minimised beyond the compounds and working areas by the use of directionally controlled lighting.

8.6.5 Recommendations from the Bat Conservation Trust and the Institution of Lighting Professionals, titled Guidance Note 8 Bats and Artificial Lighting'[86] will be followed, where possible, when designing any lighting scheme for the proposed development. LED directional lighting would be utilised along the Scheme during the operational phase to avoid light spill beyond the road alignment. The position of the road within cuttings or behind screening mounds, and the landscaping proposals with tall vegetation would further reduce light spill on to adjacent areas.

[82] Pollution Prevention Guidelines (PPGs), https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/
[83] Guidance for Pollution Prevention (GPPs), https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/
[84] British Standard 3998:2010 Tree Work - Recommendations
[85] British Standard 5837:2005 Trees in Relation to Construction – Recommendations
[86] https://theilp.org.uk/publication/guidance-note-8-bats-and-artificial-lighting/

8.6.6 Measures to mitigate impacts from changes in road drainage are described in Chapter 2, Section 2.7. Additional mitigation with regard to air quality are to be developed as appropriate and as informed by the Air Quality chapter (Chapter 5).

Potential Effects and Essential Mitigation

Lowland mixed deciduous woodland

Effects during construction

8.6.7 Potential effects include physical loss, damage and fragmentation. There would also be potential for habitat damage/ degradation to arise during construction in the form of dust deposition and chemical pollution.

Effects during operation

8.6.8 There is potential for habitat degradation/ pollution via road drainage, fragmentation, run-off, de-icing salts, spray from road traffic, and air pollution (primarily nitrogen deposition).

Mitigation during construction

8.6.9 Planting of new species rich high-quality broadleaved woodland. Habitat losses would be quantified to ensure no net loss and where possible, increase to provide more robust and resilient ecosystem in area and quality.

Mitigation during operation

8.6.10 No additional mitigation identified. No significant adverse residual impacts are anticipated if all mitigation measures are implemented.

Hedgerows

Effects during construction

8.6.11 Potential effects include physical loss, damage and fragmentation. There would also be potential for habitat damage/ degradation to arise during construction in the form of dust deposition and chemical pollution.

Effects during operation

8.6.12 There is potential for habitat degradation/ pollution via road drainage, fragmentation, run-off, de-icing salts, spray from road traffic, and air pollution (primarily nitrogen deposition).

Mitigation during construction

8.6.13 Planting of new good condition native intact species-rich hedgerows with trees and new native intact species-rich hedgerows to replace that which has been lost, and where possible, provide an increase to provide more robust and resilient habitats.

Mitigation during operation

8.6.14 No additional mitigation identified. No significant adverse residual impacts are anticipated if all mitigation measures are implemented.

Standing water bodies (ponds)

Effects during construction

8.6.15 Potential effects include physical loss of ponds under the footprint of the Scheme and damage to ponds remaining in-situ. Damage to pond habitats may occur through dust deposition and sediment ingress associated with general construction works. There is also the potential for accidental spills of chemicals and other potentially toxic substances to occur.

Effects during operation

8.6.16 Potential alteration to local surface water and groundwater hydrology such that the quantity and/or quality of water within retained ponds is affected.

8.6.17 Pollution as a result of storm water run-off or accidental spillages from road traffic accidents.

Mitigation during construction

8.6.18 Creation of new ponds of a similar size, structure and permanence to those lost to the Scheme at a minimum ratio of one lost to one created.

8.6.19 Adoption of best practice pollution prevention and control measures.

8.6.20 Where possible, the maintenance of an 8 m buffer around ponds where no works to the pond are required.

Mitigation during operation

8.6.21 Implementation of an appropriate drainage strategy, incorporating Sustainable Drainage Systems (SuDs) to mitigate the pollution risk associated with road runoff.

Main Rivers (including effects on fish and aquatic macroinvertebrates)

Effects during construction

8.6.22 There is potential for effects to the River Etherow associated with the proposed River Etherow crossing. Potential effects include temporary and permanent loss of riparian habitat from construction of the abutments and central pier, and permanent shading of habitats from the bridge deck altering vegetation composition within both the river channel and riparian corridor.

8.6.23 No new structures or works are proposed within or adjacent to the Glossop Brook and as such no direct effects are anticipated.

8.6.24 Potential effects to the Hurstclough Brook include physical loss, damage and fragmentation associated with the construction of a new crossing, potential extensions to existing crossings, localised realignments and drainage structures.

8.6.25 Further damage to Main River habitats and associated species may occur through dust deposition and sediment ingress associated with general construction works. There is also the potential for accidental spills of chemicals and other potentially toxic substances to occur.

Effects during operation

8.6.26 Potential alteration to local surface water and groundwater hydrology such that the quantity and/or quality of water within Main Rivers is affected.

8.6.27 Pollution as a result of storm water run-off or accidental spillages from road traffic accidents.

Mitigation during construction

8.6.28 Clear span bridge to minimise impacts to the banks and channel of the River Etherow. Abutments and the central pier would be set a minimum of 5 m from the channel edge.

8.6.29 Where possible, the maintenance of an 8 m buffer either side of Main Rivers where no works to the watercourse are required.

8.6.30 Any areas of temporary riparian habitat loss during the construction phase would be reinstated prior to the Scheme becoming operational (i.e. at proposed culverts). Reinstated habitat would be returned to a condition of ecological value equal to or above that identified during baseline surveys.

8.6.31 Any permanent loss of watercourse to be compensated through watercourse habitat enhancements on the same watercourse where possible.

8.6.32 Adoption of best practice pollution prevention and control measures to minimise pollution.

Mitigation during operation

8.6.33 Implementation of an appropriate drainage strategy, incorporating SuDs to mitigate the pollution risk associated with road runoff.

Ordinary Watercourses (including effects on fish and aquatic macroinvertebrates)

Effects during construction

8.6.34 Potential effects include physical loss, damage and fragmentation associated with the construction of new crossings (namely culverts), extensions to existing crossings, localised realignments and drainage structures.

8.6.35 Further damage to Ordinary Watercourse habitats and associated species may occur through dust deposition and sediment ingress associated with general construction works. There is also the potential for accidental spills of chemicals and other potentially toxic substances to occur.

Effects during operation

8.6.36 Potential alteration to local surface water and groundwater hydrology such that the quantity and/or quality of water within Ordinary Watercourses is affected.

8.6.37 Pollution as a result of storm water run-off or accidental spillages from road traffic accidents.

Mitigation during construction

8.6.38 Adoption of best practice pollution prevention and control measures to minimise pollution.

Mitigation during operation

8.6.39 Where possible, the maintenance of an 8 m buffer either side of ordinary watercourses where no works to the watercourse are required.

8.6.40 Any areas of temporary riparian habitat loss during the construction phase would be reinstated prior to the Scheme becoming operational (i.e. at proposed culverts). Reinstated habitat would be returned to a condition of ecological value equal to or above that identified during baseline surveys. Any permanent loss of watercourse to be compensated through watercourse habitat enhancements on the same watercourse where possible.

8.6.41 Implementation of an appropriate drainage strategy, incorporating SuDs to mitigate the pollution risk associated with road runoff.

Bats

Effects during construction

8.6.42 Potential effects include damage/ destruction to roosts, foraging habitat and commuting routes which could lead to fragmentation. Also, there is potential for disturbance/ degradation of habitats (e.g. noise, vibration and light pollution) and death/ injury of individuals from construction related hazards (such as collision with construction vehicles) which could cause displacement and changes in behaviour.

Effects during operation

8.6.43 Road lighting and visual disturbance from a more elevated and/ or wider road may result in bats altering their use of habitat through avoidance of the road (i.e. it becomes a barrier to movement), mortality through traffic collisions, or an alteration to commuting routes which may expose bats to different risks that would normally be avoided.

Mitigation during construction

8.6.44 Pre-construction surveys to update current baseline. Works affecting known roosts to be undertaken in accordance with a European Protected Species Mitigation (EPSM) licence from Natural England.

8.6.45 Sensitive timings of works: destruction of the roost to be undertaken between 1st September and 30th November to reduce the likelihood of encountering bats during the maternity and hibernation period, where possible. Installation of temporary bat roost provision (i.e. bat boxes) in suitable locations prior to any construction commencing. Bat roosts would be demolished (under licence) following a precautionary working method to reduce the risk of killing or injuring any bats. Demolition would be supervised by a licenced bat worker who would give a toolbox talk to demolition contractors prior to works starting on site to make them aware of the possible presence of bats, their legal protection and of working practices to avoid harming bats.

8.6.46 Methods to reduce noise, vibration, light and other disturbance during the construction.

Mitigation during operation

8.6.47 Measure may include the construction of a dedicated bat house or structure and a range of bat boxes ('Habibat' or similar design) to mitigate for the loss of roosting spaces to be lost through the Scheme.

8.6.48 Positioning of road within cuttings or behind screening mounds. 'Bat hops' across the carriageway at strategic locations to aid crossing of the road and prevent collisions with road traffic. Loss of bat foraging and roosting habitat would be mitigated through the creation of significant areas of replacement habitat, which includes a net increase in native woodland, tree and hedgerow planting, watercourses, water bodies and the creation of species-rich grasslands, shrubs and scrub. These new habitats would support an abundance of invertebrate prey providing foraging habitat for bats. Dark corridors with no or very limited artificial lighting at strategic locations to aid movement.

8.6.49 No significant adverse residual impacts are anticipated if all mitigation measures are implemented.

Badger

Effects during construction

8.6.50 There are two main badger setts within the DCO boundary and two in close proximity whose territories overlap with the Scheme. Potential effects include damage/ destruction of setts, fragmentation, and loss of foraging habitat. Also, there is potential for disturbance (i.e. noise, vibration, light and chemical pollution) and death/injury of individuals from construction related hazards (such as collision with construction vehicles, entrapment in excavations, etc).

Effects during operation

8.6.51 Impacts from an increase in noise and lighting on commuting and foraging behaviour. Increased road mortality.

Mitigation during construction

8.6.52 Creation of three artificial badger setts within the current respective territory of the badger clan and subsequent closure of up to three main setts, six outliers, and up to two subsidiaries. Pre-construction surveys prior to construction to update current baseline data. Works affecting badger setts to be undertaken in accordance with a licence from Natural England. Adoption of best practice pollution prevention and control measures to minimise pollution, disturbance and entrapment. Safe crossing points provided to maintain connectivity during construction to enable badgers access to the wider landscape as required.

Mitigation during operation

8.6.53 Safe crossing points (via mammal passes and culverts) within the territory of each badger clan will be installed to aid movement under the new link road and into the wider landscape. Linear fencing will be utilised to prevent road mortalities and guide

badgers to the safe crossing points. Fencing would be minimum standard 1 m high above ground level with a lower section buried 300 mm below ground and a further 300 mm turned away from the fence in the direction from which badgers would approach.

8.6.54 Increase in habitat quality and connectivity via landscape design to improve badger foraging opportunities. Dark corridors with no or very limited artificial lighting at strategic locations (i.e. safe crossing points) to aid movement.

8.6.55 No significant adverse residual impacts are anticipated if all mitigation measures are implemented.

Birds

Effects during construction

8.6.56 Potential impacts include habitat loss, severance, fragmentation, mortality, injury and disturbance whilst breeding, foraging, and commuting. Increased visual (including light pollution) or noise disturbances during the construction phase could also cause displacement and changes in behaviour.

Effects during operation

8.6.57 Road lighting and visual disturbance from a more elevated and/ or wider road may result in birds altering their use of habitat through avoidance of the road (i.e. it becomes a barrier to movement), mortality through traffic collisions, or an alteration to commuting routes which may expose birds to different risks that would normally be avoided.

Mitigation during construction

8.6.58 Undertaking works outside of the core nesting season (the core nesting season is 1st March until 31st August, subject to seasonal variation) and/ or pre-commencement surveys to establish likely absence. If work has to be undertaken during the core bird nesting season, a detailed inspection for nesting birds of all scrub, trees and structures due for clearance and or demolition would be carried out by an Ecologist no more than 24 hours prior to any works being undertaken to minimise opportunities for nest building between the survey and the start of works. Any nest in use or being built during this inspection would be left undamaged, with an appropriate buffer of surrounding vegetation for the entire nesting period and alternative approaches to the works proposed. This buffer would be dependent on the species present and the adjacent habitat and will be determined on a case by case basis by an Ecologist.

8.6.59 Methods would be implemented to reduce noise, light and other disturbance during construction. Pre-commencement surveys for kingfisher would be undertaken prior to works commencing on the River Etherow.

Mitigation during operation

8.6.60 Tall vegetation (approximately 3 m above road height) would be planted to obstruct low-level flight across the carriageway and prevent collisions with road traffic in strategic locations (particularly near barn owl nest sites on the west of the Scheme). Loss of suitable bird nesting and foraging habitats would be mitigated via net

increases in native woodland, hedgerow, tree planting, watercourses, water bodies, and the provision of species-rich grassland, shrubs and scrub.

8.6.61 In addition to native planting, bird boxes suitable for a range of species would be erected on retained trees and buildings to provide suitable nesting habitats until the new planting has established. Creation of marshy grassland around the proposed SuDS scheme to provide habitat for waders (i.e. curlew).

8.6.62 No significant adverse residual impacts are anticipated if all mitigation measures are implemented.

Otter

Effects during construction

8.6.63 The River Etherow is known to support commuting otter and approximately 315 m of the River extends within the DCO boundary. Potential effects include the potential for disturbance of commuting otters (e.g. noise, vibration, light and chemical pollution) and death/ injury of individuals from construction related hazards (such as collision with construction vehicles, entrapment in excavations, etc). As a clear span bridge would be utilised, there would be no permanent loss of bankside habitat, however, may include changes in vegetation composition due to an increase in shading.

Effects during operation

8.6.64 Visual disturbance from the clear span bridge crossing may result in otters altering their use of habitat through avoidance or resulting in an alteration to commuting routes which may expose them to different risks (such as traffic collision). There is also potential for polluted road run-off affecting the water environment and for impacts through traffic noise and road lighting.

Mitigation during construction

8.6.65 Maintenance of 8 m buffer either side of retained/unmodified sections of the river. Pre-commencement survey on the River Etherow to update the current baseline.

8.6.66 Clear span design of the River Etherow Bridge to avoid impacts to the banks and retain connectivity. Otter-proof fencing would be installed, extending from each side of the River Etherow Bridge to be installed on either side of the Scheme for a distance of 100 m in each direction, to prevent mortality through traffic collision. Safe crossing points (via mammal passes and culverts) would be installed to retain connectivity throughout the Scheme.

8.6.67 No significant adverse residual impacts are anticipated if all mitigation measures are implemented.

Water vole

Effects during construction

8.6.68 Potential effects include damage/ destruction of burrows and fragmentation of habitat. Also, there is potential for disturbance (i.e. noise, vibration, light and chemical pollution) and death/ injury of individuals from construction related hazards (such as entrapment in excavations, etc.).

Effects during operation

8.6.69 There is also potential for polluted road run-off affecting the water environment and for impacts through traffic noise and road lighting.

Mitigation during construction

8.6.70 Avoidance of retained/ unmodified sections of watercourse where water voles have been recorded. Pre-commencement survey on the River Etherow and unnamed watercourses to update current baseline.

Mitigation during operation

8.6.71 Clear span design of the River Etherow Bridge to avoid impacts to the banks and retain connectivity. Safe crossing points (via mammal passes and culverts) over the other watercourses to retain connectivity throughout the Scheme. Net increase in watercourses and water bodies to provide additional habitat for water voles.

8.6.72 No significant adverse impacts are anticipated if all mitigation measures are implemented.

Priority species (hedgehog and brown hare)

Effects during construction

8.6.73 Direct mortality during vegetation removal and site clearance using machinery. Leverets (young hare) would be particularly susceptible as they are left alone in forms during the day and may be reluctant to move from their places of refuge. There is also the potential for hares/ hedgehogs to be killed through becoming trapped in excavations and construction equipment or from collision with construction vehicles. Works associated with the construction of the Scheme would also result in permanent loss and fragmentation of foraging habitat and disturbance (e.g. noise, vibration, light and chemical pollution).

Effects during operation

8.6.74 Increased risk of collision with traffic and habitat fragmentation. There is also potential for disturbance as a result of road noise and traffic movements.

Mitigation during construction

8.6.75 Pre-commencement checks for brown hare/ hedgehog within suitable habitats prior to operations. Creation of high-quality habitat for brown hare and hedgehog within the DCO boundary.

Mitigation during operation

8.6.76 Safe crossing points (via underpasses and culverts with mammal ledges) would be constructed with linear planting and fencing provided to guide hedgehog/brown hare towards these crossings. Hibernacula (comprised of logs/brash) will be created at strategic locations to provide continued hibernation/ refuge places for hedgehog.

8.6.77 No significant adverse residual impacts are anticipated if all mitigation measures are implemented.

Common toad

Effects during construction

8.6.78 Direct mortality during vegetation removal and site clearance using machinery. There is also the potential for common toad to be killed through becoming trapped in excavations and construction equipment or from collision with construction vehicles. Works associated with the construction of the Scheme would also result in permanent loss and fragmentation of foraging habitat. Loss of breeding habitat through reduction of water bodies.

Effects during operation

8.6.79 Increased risk of collision with traffic and habitat fragmentation.

Mitigation during construction

8.6.80 Pre-commencement checks for common toad within suitable habitats prior to operations. Creation of new water bodies to replace those lost to provide continued breeding habitat for common toad. Creation of new high-quality habitat (including marshy grassland and woodland), especially in close location to water bodies.

Mitigation during operation

8.6.81 Safe crossing points (via underpasses and culverts with mammal ledges) will be constructed with linear planting and fencing provided to guide common toad towards these crossings. Hibernacula (comprised of logs/ brash) will be created at strategic locations to provide continued hibernation/refuge. The use of wildlife kerbs and 'Enkamet' climbing ladders[87] within any constructed gully pots to mitigate against entrapment.

8.6.82 No significant adverse residual impacts are anticipated if all mitigation measures are implemented.

8.7 Summary

8.7.1 The baseline information gathered to date has covered the predicted EZoI of the Scheme and provided an initial ecological value of each receptor. This has included a desk study and ecological surveys of designated sites, habitats, and notable and protected species.

8.7.2 Based on the preliminary environmental assessment carried out for this report, it has been established that, although the Scheme will have significant adverse effects on habitats, protected and notable species, the Scheme has the potential to have neutral to beneficial residual effects on these and other nature conservation resources. This is due to the incorporation of mitigation measures during construction to avoid or reduce impacts and compensation measures built into the design. Compensation measures will include provision of new high-quality habitats, new roosting features for bats/birds, and artificial badger setts. Existing habitats will also be enhanced through measures to control invasive species and increase the habitat suitability for notable species.

[87] http://www.sussexarg.org.uk/uploads/7/1/7/1/7171006/toadladders.pdf

8.7.3 Further consultation with relevant stakeholders will be undertaken and reported in the ES, which will guide the final mitigation and compensation strategy for the Scheme. However, it is considered that the mitigation and compensation proposals that have been described in this chapter have taken into consideration the requirements of the DMRB LA108, by enhancing existing habitats, creating new habitats and minimising habitat fragmentation.

9 Geology and Soils

9.1 Introduction

9.1.1 This section provides the preliminary assessment for geology and soils as outlined in DMRB LA109[88] for assessing and managing the:

- 1) effects on bedrock geology and superficial deposits, including geological designations and sensitive/valuable non-designated features;
- 2) effects on soil resources; and
- 3) effects from contamination on human health, surface water and groundwater

9.1.2 The assessment of soil resources also includes the identification of agricultural soils and agricultural land classification (ALC) of farmland affected by the Scheme.

9.1.3 This section establishes the baseline conditions, outlines the additional surveys which are required for the Environmental Statement (ES), general method of the assessment, identifies the potential impacts on geology and soils associated with the Scheme during construction and operation, and presents preliminary mitigation measures that are recommended to mitigate any potentially significant adverse effects.

9.1.4 In addition, this section assesses potential hydrogeological impacts associated with geology and soils with reference to DMRB LA113[89] associated with groundwater level and quality due to potential impacts from the Scheme.

9.2 Study Area

9.2.1 The study area for the existing environmental conditions comprises up to a 250 m buffer from the Development Consent Order (DCO) boundary. The baseline information covers the scheme and the study area; and where relevant in the identification of sensitive receptors, is increased to between 500 m to 1 km. The buffer associated with hydrogeological (groundwater) receptors is1 km.

9.2.2 The study area for agricultural soils and ALC is the scheme boundary that includes compounds and temporary land take.

9.3 Methodology

9.3.1 The assessment in relation to Geology and Soils will take into account the scheme design, study area and the assessment methodology in accordance with DMRB LA109 and LA113. The assessment will also take into account the effects associated with contaminated land risk using Environment Agency Land Contamination Risk Management (LCRM) guidance and the Water Framework Directive (WFD).

9.3.2 The assessment for the scheme and study area is based on the following currently available information:

[88] https://www.standardsforhighways.co.uk/dmrb/search/adca4c7d-4037-4907-b633-76eaed30b9c0
[89] https://www.standardsforhighways.co.uk/dmrb/search/d6388f5f-2694-4986-ac46-b17b62c21727

- A57/A628 Transpennine Upgrade Programme, Preliminary Sources Study Report (PSSR), Arcadis/Highways England, June 2017 (ref: HE551473-ARC-HGT-ZZZ-GE-2001) including information provided by Envirocheck.
- Trans-Pennine Upgrade (TR010334) UXO Desk Study, Highways England, Rev V1.1.1, October 2018 (ref: HE551473-ARC-EGT-TPU-RP-LE-3214).
- Trans-Pennine Upgrade (TR010334) Ground Investigation Report (GIR), Highways England, Rev V0.2.0, February 2019 (ref: HE551473-ARC-HGT-TPU-RP-CE-3199).
- Trans-Pennine Upgrade (TR010334) Coal Mining Report, Highways England, Rev V0.1.1, April 2019 (ref: HE551473-ARC-EGT-TPU-RP-LE-3213).
- Trans-Pennine Upgrade (TR010334) Water Features Survey, Highways England, Rev V0.2.0, April 2019 (ref: TR020034/APP/6.12.1).
- Trans-Pennine Upgrade (TR010334) Groundwater Modelling Report, Highways England, Rev 0.2.0, April 2019 (ref: TR010034/APP/6.12.2).
- Consultations undertaken by Arcadis, as follows:
  - Environment Agency via Greater Manchester, Merseyside and Cheshire (GMMC), dated 26 April 2018;
  - High Peak Borough Council Environmental Search, dated 28 June 2018; and
  - Tameside Metropolitan Borough Council Environmental Protection, dated 3 July 2018.
- A review of available information pertaining to agricultural soils:
  - Soil Survey of England and Wales (1983). Soils of England and Wales, Sheet 1 Northern England. Rothamsted Experimental Station.
  - Soil Survey of England and Wales (1984). Soils and their Use in Northern England. Rothamsted Experimental Station.
  - Ministry of Agriculture Fisheries and Food (MAFF) Agricultural Land Classification map North West England. http://publications.naturalengland.org.uk/category/5954148537204736, Viewed August 2020.
  - Ministry of Agriculture, Fisheries and Food (1988), Agricultural Land Classification of England and Wales – Revised guidelines and criteria for grading the quality of agricultural land.
  - http://archive.defra.gov.uk/foodfarm/landmanage/land-use/documents/alc-guidelines-1988.pdf, Viewed August 2020.
  - Natural England (2012), Technical Information Note 049: Agricultural Land Classification: protecting the best and most versatile agricultural land http://publications.naturalengland.org.uk/publication/35012, Viewed August 2020.

9.4 Existing Environmental Conditions

Published Geology

9.4.1 The Preliminary Sources Study Report (PSSR) (Arcadis, 2016) and British Geological Survey (BGS) 1:50,000 scale geological maps (Sheet 86 Glossop and Sheet 87 Barnsley) discussed within this report show that superficial Devensian Till (gravel, sand and clay) underlies the majority of the study area. In the eastern portion of the study area, the presence of Head (clay) deposits, Alluvium (clay, silt, sand, peat and basal gravel) with an area of River Terrace Deposits (sand and gravel) associated with the River Etherow area mapped. Bedrock beneath the Till comprises lithologies of the Millstone Grit Group and varies along the route and across the study area comprising:

- Hebden Formation (Mudstone and Siltstone);
- Lower Kinderscout Grit (Sandstone);
- Fletcher Bank Grit (Sandstone);
- Marsden Formation (Mudstone and Siltstone);
- Huddersfield White Rock (Sandstone);
- Rossendale Formation (Mudstone and Siltstone);
- Marsden Formation (Mudstone and Siltstone); and
- Huddersfield White Rock (Sandstone).

9.4.2 Two fault lines are mapped to be crossing the Scheme. One positioned across the A57 east of the existing M67 Junction 4 at the western extent of the Scheme. The other fault crosses the location of the proposed Mottram Underpass running north west to south east with Marsden Formation on the south west side and Fletcher Bank Grit or Sandstone on the north east side.

9.4.3 An additional fault is mapped crossing the most northern section of the study area but in a north east to south west direction. Within the study area other fault lines are mapped to the west and south of the Scheme.

9.4.4 Volume 3 Figure 9.1 provides a summary of the geological conditions.

Encountered Geology

9.4.5 A number of ground investigations have taken place across the scheme including:

- Socotech, 2018;
- Furgo Engineering Services, 2005;
- Norwest Holst Soil Engineering, 2004; and
- Soil Mechanics, 1995.

9.4.6 A report entitled ‘A57/A628 Trans Pennine Upgrade Programme – Ground Investigation Report’ (GIR), February 2019 provides details of the ground conditions encountered which is generally consistent with the anticipated published geology as previously summarised as given in Table 9-1 below.

Table 9-1 - Summary of Encountered Geology

Section of Scheme	Geology Encountered
Western extent/Old Mill Farm Underpass	Thin layer of topsoil (0.5 m thickness) which is described as slightly sandy Clay with rootlets. Predominately cohesive Glacial Till is encountered beneath topsoil which thins from west (26m) to east (22m). This could be associated with a buried (superficial deposit filled) channel. Till is described as soft to firm occasionally stiff to very stiff slightly sandy occasionally gravelly Clay. At the western end, occasional pockets of alluvium are present (1.4m thickest) which is composed of soft sandy clay with much peat. Bedrock was proven in two boreholes at the western end of the section of the main scheme at depths of approximately 26 m bgl comprised highly to slightly weathered, moderately strong to strong siltstone.
Western Cutting	Topsoil is present (0.4 m thickness) over Glacial Till which thins out moving eastwards with an approximate thickness of 15m at the eastern end of this section. The upper layers towards the western extent have a gravelly component. Bedrock beneath the Till is from the Millstone Grit group and is predominately very weak to moderately weak mudstone. At the eastern end of the proposed cutting (near to Mottram Underpass) the bedrock is dominated by sandstone and siltstones.
Mottram Underpass	The uppermost materials found in this section are a mixture of topsoil and Made Ground due to the urban nature of Mottram village. Topsoil is found to a depth of 0.5 m and is composed of very soft to soft slightly sandy clay or slightly sandy clayey silt with abundant rootlets. Made Ground thicknesses range from 0.1 m to 2.8 m and is composed of Tarmac and hardcore in the upper layers followed by predominantly fine to coarse sand and gravel including fragments of concrete and brick. Clay is also present and is described as soft to firm, slightly sandy slightly gravelly, occasionally very silty clay with gravel of mixed lithologies. Glacial Till is found beneath the Made Ground/Topsoil and generally thins to the east as the Scheme reaches the edge of a buried palaeochannel. At the western end the Till reaches a depth of approximately 14.5 m to a minimum of approximately 3.5 m at the eastern end of the proposed Mottram Underpass. It is predominantly cohesive with occasional areas of granular material (CH880) and laminated clays (CH975). The cohesive material is described as soft to stiff, slightly sandy occasionally gravelly clay with gravel of mixed lithologies. Granular superficial deposits are described as medium dense, fine to medium, slightly gravelly clayey sand or gravel. The Millstone Grit Group is generally composed of interbedded siltstones and sandstones at the western end of the proposed Mottram Underpass, becoming more mudstone dominated towards the east. This may be due to the faulting in the area, bringing different formations in contact with each other.
Eastern Cutting	At the western end of this section, Made Ground is present due to the urban surroundings. The maximum thickness is 2.6 m but generally 1m of Made Ground is recorded across this area. Moving eastwards this becomes topsoil (1.2 m thickest recorded) as the land becomes more agricultural. The Made Ground consists of mixed material types of sand and gravel with occasional areas of firm clay. Glacial till is identified below the Made Ground/topsoil which reduces in thickness moving eastwards.
Eastern Extent	Topsoil is present, over Glacial Till of varying thickness (1.6 m in west, 22 m in centre of this section and 10m at eastern end). The bedrock is

Section of Scheme	Geology Encountered
	dominated by interbedded sandstones and siltstones of approximately 0.5 m to 1 m thickness, however these have been recorded as between 6 m and 8 m thick in some sections. Made Ground (1.6 m thickness) has been recorded in the area of the Longdendale Aqueduct and is described as gravelly sand, gravel or sandy gravelly clay.

9.4.7 Chemical testing of soils has indicated some potentially elevated concentrations of Poly Aromatic Hydrocarbons (PAHs) and lead. There is also potential for in-ground asbestos containing materials to be present.

Designated Geological Sites

9.4.8 The JNCC Geological Conservation Review and MAGIC website (www.magic.gov.uk) indicates that there are no recorded geodiversity heritage sites, Regionally Important Geology Sites (RIGS) or geological SSSIs within 1km of the Scheme.

Coal Mining and Mineral Deposits

9.4.9 The Scheme and study area are within a coal mining affected area.

9.4.10 The Coal Authority Report indicates that there are two mine entries on, or within 20 m of the boundary of the Scheme, towards the south west. Details in the available PSSR indicates that the risk of shallow coal mining is low, and the two mining entries shown relate to the Longdendale aqueduct airshaft.

9.4.11 From the Landmark Environmental Database discussed in the PSSR, no mineral sites are indicated within the Scheme, the nearest mineral site being approximately 200 m from the scheme.

9.4.12 From the Landmark Environmental Database discussed in the PSSR, there are no natural cavities recorded along the scheme; however, there may be unrecorded natural cavities present within the study area.

Hydrogeology and Hydrology

9.4.13 The geology beneath the site is classified as the following aquifers:

- Devensian Till and Head deposits : Secondary (undifferentiated);
- Alluvium and River Terrace deposits: Secondary A aquifer; and
- Bedrock: Secondary A Aquifer.

9.4.14 The study area is not within a groundwater Source Protection Zone.

9.4.15 There are no registered Environment Agency groundwater abstractions (licensed) within the study area. There are five private abstractions (recorded by TMBC) from spring, surface and groundwater (borehole) located within the study area and some additional private spring, well and borehole abstractions within a 1 km radius identified through the surface water features survey.

9.4.16 Groundwater was encountered in the superficial and bedrock during the 2018 ground investigation, which also reported the presence of artesian conditions. In the Mottram

area the Till was found to behave as an aquitard inhibiting the upward flow of groundwater originating from the Millstone Grit Group. Glacio-fluvial deposits present at the eastern end of the route, within the vicinity of the River Etherow, were found to form a confined water unit sandwiched between the Glacial Till and underlying bedrock. The Millstone Grit Group is also affected by tectonic deformation, is strongly weathered and faulted which may affect groundwater flow.

9.4.17 Surface waters present within the DCO boundary and study area comprise (refer to Volume 3 Figure 13.1):

- The River Etherow;
- Glossop Brook;
- Hurstclough Brook; and
- A number of field drains.

9.4.18 Groundwater flow was interpreted in the GIR as follows:

- In the Millstone Grit Group is generally in a south easterly direction towards the River Etherow;
- Groundwater west of Mottram in Longdendale Village is considered likely to discharge towards the south-west towards Hurstclough Brook, due to high ground to the south associated with an outcrop of Rossendale Formation (a formation of the Millstone Grit Group);
- A shallower hydraulic gradient is present around the River Etherow at the eastern end of the route. This is likely to be associated with the higher permeability deposits present in this area; and
- Large changes in groundwater elevation (up to 10 m) have been recorded in the areas of tectonic deformation within Mottram Village.

9.4.19 Groundwater analysis undertaken from exploratory holes as part of the 2018 ground investigation identified minor elevated concentrations of some contaminants including metals, Polycyclic Aromatic Hydrocarbons (PAHs) and Total Petroleum Hydrocarbons (TPH).

9.4.20 Volume 3 Figure 9.1 provides a summary of the hydrogeological conditions.

Historical Development/Potentially Contaminative Land Uses

9.4.21 The earliest maps (circa 1881) show the Scheme lies within agricultural land with a number of farmsteads and established roads throughout the study area. The town of Mottram is shown to the south, Roe Cross to the north and Hollingworth to the east. Notable features within the study area at this time include a quarry near Roe Cross (250 m north) and Mottram Old Mill (Woollen) with several mills and quarries within the study area.

9.4.22 In 1910, a small gas works is mapped adjacent to Woolley Lane on the south western edge of Hollingworth and a Bleach Works and associated tanks and Mersey Mills are located adjacent to River Etherow to the east. Light industry (Wadding Manufactory) are indicated to the north in Lower Roe Cross.

9.4.23 In 1950, additional industrial activities (Rhodes Mill (disused), Longdendale (Works) are shown to the east of the study area near Woolley Bridge near to the Bleach Works. A sewage works can be seen approximately 300 m to the south of the Scheme in Longdendale.

9.4.24 By 1983, residential development in Mottram and Hollingworth has significantly increased. The industry to the north in Lower Roe Cross is no longer shown. A garage is located in the vicinity of the gas works which is no longer indicated.

9.4.25 The site currently comprises a mixture of residential, industrial with significant areas of agricultural and open space land uses with any potential contaminative sources generally being associated with agricultural use.

9.4.26 The Envirocheck Environmental Database indicates there are potentially 40 trade entries in the study area with the majority located to the east in the area of Hollingworth and Hadfield. There is a small cluster of entries associated with Mottram which relate to car dealerships, garage services and blind manufacturers. It also records the presence of six fuel stations within the study area, four are indicated adjacent to the red line boundary of the Scheme.

9.4.27 Environment Agency consultation in 2018 provided a list of pollution incidents within the study area. There are 28 recorded incidents dating between June 2001 and January 2018. For those impacts to Land and Water, the categories were either No Impact (Category 4) or Minor Impact (Category 3) with pollutants involved ranged from firefighting runoff, oils, crude sewage and diesel.

Recorded Landfill Sites

9.4.28 Table 9-2 details the landfill sites recorded within the study area.

Table 9-2 - Summary of landfill sites within study area

Landfill	Dates	Type of Waste	Distance from DCO Boundary
Land adjacent to Woolley Lane Gas Works	Nov 1993 – Jan 1996	Inert	Within and adjacent to north eastern Scheme boundary
Carrhouse Lane		No information provided	Within the Scheme
Disused Railway Line	Dec 1990 – Oct 1991	Inert	100 m east of Scheme
Melandra Road Waste Disposal Site	Dec 1977 – Dec 1981	Inert, Industrial, Commercial, Household and Liquid/Sludge	100 m south east of Scheme

9.4.29 Volume 3 Figure 9.1 provides a summary of the key potential land contamination constraints.

Unexploded Ordnance

9.4.30 A preliminary desk study was undertaken by Zetica (UXO specialists) for the Scheme. This concluded that no readily available records of bombing or other significant

military activity on the site have been found. It is considered that the site is likely to have a Low UXO hazard level.

Agricultural soils

9.4.31 Soils within the scheme are mostly developed in heavy textured Glacial Till with alluvium on the floodplain of the River Etherow.

9.4.32 Three soil associations (recurring groupings of soils within similar landscapes) are mapped within the study area:

- The Wilcocks association occupies the western part of the study area between the M67 Junction 4 and Carrhouse Lane. These acid soils have a peaty surface horizon over heavy clay loam over clay and are waterlogged for long periods.
- East of Carrhouse Lane there is the Brickfield association whose soils are similar to the Wilcocks but lack a peaty topsoil.
- On the floodplain of the River Etherow there are clay loam soils of the Enborne association affected by a high water table and flooding.

Agricultural land classification

9.4.33 MAFF's Provisional ALC map of North West England shows all the study area to be Grade 4 (poor quality land). There is some Grade 3 (good to moderate) west of the M67 Junction 4 and Grade 5 (very poor quality) on the moors to the north and east. This indicates that, in its regional context, the land in the study area has no special agricultural value.

9.4.34 The 1988 MAFF issued Revised guidelines and criteria for grading the quality of agricultural land. These guidelines provide detailed parameters for identifying the factors limiting agricultural land quality and also provide a method for subdividing Grade 3 into Subgrades 3a and 3b. Natural England and the National Planning Policy Framework class land in Grades 3a and better as best and most versatile (BMV), and requiring protection from development. DMRB LA 109 assigns high and very high values to such land and a loss of more than 1ha is assessed as a significant adverse effect.

9.4.35 The factors relevant to the revised ALC guidelines in the study area relate to a combination of climate, soil texture and wetness. Additionally, land beside the Etherow has a flood risk.

9.4.36 The local climate, at an altitude of 18 0m OD, is wet, with an average annual rainfall of 1032 mm and 236 field capacity days (FCD).

9.4.37 Topsoil textures, except the floodplain are heavy clay loam or clay, and peaty in the western part. Subsoils are dense and slowly permeable, producing a perched water table. The soils of the floodplain are medium or heavy clay loams, but more permeable than those in till and affected by a high groundwater table.

9.4.38 Soil wetness is expressed by a Wetness Class (WC) which reflects the period of waterlogging within 40 cm and 70 cm of the surface in most years. Brickfield and Enborne soils are in WC IV, indicating they are wet within 40 cm for up to 180 days. Wilcock soils are in WC IV to V, being in places wet within 40 cm for more than 180 days.

9.4.39 The application of these parameters to the revised ALC guidelines means that none of the study area can be better than Grade 4 and some of the Wilcocks soils may be in Grade 5. Improved grassland cut for silage can be seen on recent and historic Google Earth imagery in the vicinity of Carrhouse Lane, supporting the likelihood that the Brickfield soils are marginally better than the others.

9.5 Other baseline information to be obtained/surveys to be undertaken

9.5.1 A PSSR, previous ground investigations and a recent GIR are available which provide significant baseline information for the scheme, extracts as summarised above provide the preliminary baseline; however, due to the design and guidance changes since this time, further baseline information will be collected and existing information reassessed in support of the environmental impact assessment and construction design including the following:

- Update to baseline information provided in the ES using publicly available data with the reassessment of the buffer zones dependant on identified sensitive receptors.
- Reconfirm the absence of geologically important sites.
- Peer review of the existing ground investigation data to inform the baseline in relation to recent land contamination guidance associated, assessed in relation to the Scheme design.
- Consultation with regulatory bodies (Local Authority Contaminated Land Officers at High Peak Borough Council and Tameside MBC, and Environment Agency) to confirm baseline information obtained in 2018, specifically pertaining to:
  - Groundwater quality and continuity with surface waters, groundwater levels and private abstraction information
  - The absence/presence of any sites classified as contaminated land under Part 2A of the Environmental Protection Act
  - Pollution incidents
  - Records of site investigations though planning within or adjacent to the study area.

9.5.2 A supplementary ground investigation will be undertaken to inform the Scheme design. This investigation has been be designed to:

- Further assess the presence or confirm absence of land impacted with contamination (including ground gases), where previous ground investigation data is not available and to support the Scheme design;
- Provide further chemical analysis of soils to determine their suitability in areas where these are proposed to be reused; and
- Further determine the hydrogeological conditions, specifically associated with the proposed Mottram Underpass and Eastern Portal Cutting for design purposes.

9.5.3 A GIR and GDR in accordance with CD622 will be submitted in support of the DCO application which will include a revised contaminated land generic quantitative risk assessment in accordance with current guidance (Environment Agency LCRM) pertaining to the historic and supplementary ground investigation data. This report will also assess the risks associated with land stability and mining hazards. Due to the programme, the ground investigation will be undertaken after the environmental impact assessment; however, it is considered that there will be sufficient information to complete the assessment. The supplementary investigation is to generally inform design and provide the relevant information associated with the DCO.

9.5.4 A Materials Management Plan (MMP) supported by a remediation strategy (if deemed required) would be submitted in support of the DCO application to enable the legal reuse of soils under the CLA:IRE Definition of Waste Code of Practice.

9.5.5 The combination of climatic, soil and other factors gives a high level of confidence that there is no BMV land in the study area and so a detailed soil/ALC survey is not required.

9.6 Potential Effects and Mitigation Measures

9.6.1 The potential effects of the Scheme during construction and operation and the measures proposed to manage them are outlined in Table 9-3 below. Embedded mitigation measures can be found in Section 2.17.2.

9.6.2 Based on the limited potential for geologically important sites being present, it is not considered that there will be a significant impact on the any statutory and non-statutory designated sites.

9.6.3 The summary has taken into account the requirements of DMRB LA109 and LA113 in addition to the LCRM Environment Agency guidance.

9.6.4 Based on the baseline, it is not considered that there is a significant source of land contamination present and limited sensitive receptors at the Scheme and within the study area, the most sensitive being identified as private groundwater abstractions.

Table 9-3 - Summary of Potential Effects and Mitigation Measures

Receptor	Effect during Construction	Effect during Operation	Mitigation
Geology/Soils including land quality and soil resources	Spread or mobilise pre-existing (historic land use) contamination across the scheme impacted on overall land quality	Spread or mobilise pre-existing (historic land use) contamination with the potential to impacted on overall land quality	Assessment of ground investigation and contaminated land risk assessment through DCO including assessment of ecological receptors Reuse of soils under appropriate guidance and documentation (e.g. CLA:IRE Definition of Waste Code of Practice and EMP in accordance with LA 120)

Receptor	Effect during Construction	Effect during Operation	Mitigation
	Pollution due to site activities (storage of fuels, spillages etc)	Pollution due to operational activities (run off to land etc)	Standard construction best practice including stockpile management Drainage design to ensure runoff does not impact on land quality
Human Health	Exposure to adjacent residents associated with dust migration during earthworks	Exposure to contaminated soil/ground gas mitigation into confined spaces in the future end use	Contaminated land risk assessment through DCO Standard construction best practice including stockpile management Remediation/mitigation measures as appropriate for end use
	Exposure to contaminated soil/ground gases by construction workers	Exposure to contaminated soil/ground gases by maintenance workers	Appropriate working practices and PPE
Groundwater/Surface Water Quality	Migration of contamination through creation of preferential pathways, surface water run off (and migration info aquifer) and dewatering (and in turn to surface waters)	Impact on water quality via preferential pathways (e.g. piling)	Ground investigation and contaminated land risk assessment through DCO including a piling risk assessment and hydrogeological assessment. Appropriate pollution prevention and licences
	Exposure to contaminated groundwater by construction workers	Exposure to contaminated groundwater by maintenance workers	Appropriate working practices and PPE
Hydrogeological regime	Impact on hydrogeological regime though creation of cuttings	Impact on hydrogeological regime though creation of cuttings	Ground investigation and hydrogeological assessment including design mitigation
Soil Resources - Agricultural Soils	Loss of non BMV agricultural land	None	Restore agricultural land temporarily acquired to its original condition and return to farming. There is no environmental mitigation for permanent loss of agricultural land.

Effects and Mitigation on agricultural soils

9.6.5 In the construction phase approximately 50 ha of agricultural will be permanently acquired and 15 ha will be occupied temporarily.

9.6.6 Land in ALC grades 4 and 5 is assigned a low value in DMRB LA 109 Table 3.11 Environmental value, and physical removal or permanent sealing of >20ha of agricultural soils is an impact of major magnitude DMRB LA 109 Table E/2.1 Magnitude of impact.

9.6.7 Land in Grades 4 and 5 is similar to or poorer than other land in the vicinity of the proposed Scheme and so has no particular local agricultural value. The significance of effect, without mitigation, is assessed as slight adverse and not material in the decision making process.

9.6.8 There will be further effects on agricultural land in the operation phase.

9.6.9 None of the affected land is of BMV quality, or significantly better than any other in the study area, so there is no need for the design to be modified to avoid land-take in any particular area of soils.

9.6.10 The 15ha temporarily acquired for construction will be restored to a condition equivalent to its original. This will be achieved by means of a Soil Handling and Management Plan following the best practice set out in Defra's *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites*[90].

9.6.11 There is no mitigation for the permanent loss of agricultural soils, apart from conserving the soils that are stripped and using them elsewhere on the Scheme. This might be for landscaping or grading embankments to maximise the area that can be returned to farming.

9.6.12 A soil management specialist will be employed by the contractor to ensure soils being stripped, stockpiled and restored are handled correctly.

Residual Effects

9.6.13 With mitigation, the residual effect of the Scheme on agricultural soils will remain slight adverse, which is not significant, for the reason stated in paragraph 9.6.7.

9.7 Summary

9.7.1 Overall, the existing baseline information has not indicated that significant land contamination is present within the study area; however to ensure construction works and operation of the scheme do not cause significant impacts to human health, soils and controlled waters, environmental mitigation working practices and scheme design will be undertaken through the planning process.

9.7.2 Further ground investigation and assessment will also ensure that the creation of cuttings and the earthworks proposed will also not cause any significant impact in relation to the hydrogeological regime and the suitability and sustainability of the reuse of soils.

9.7.3 Land stability will be addressed through the requirements of CD622 under the DCO.

9.7.4 No BMV agricultural land will be affected by the Scheme. In the construction phase around 50 ha will be permanently acquired and 15 ha will be occupied temporarily. The latter will be restored to its original condition and returned to farming. The

[90] Department for Environment, Food and Rural Affairs (2009), *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites*. https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites Viewed August 2020

residual effect of loss of agricultural land is assessed as only slight adverse, which is not significant

10 Materials assets and waste

10.1 Introduction

10.1.1 This chapter provides preliminary information for material assets and waste based on information available as of the end of September 2020. A full assessment will be carried out in the Environmental Statement (ES) when full design information is available.

10.1.2 It has been written in accordance with the Design Manual for Roads and Bridges (DMRB) LA 110 Material assets and waste[91] standard.

10.1.3 The chapter outlines the methodology that will be used to identify and assess the likely impacts of material use and waste generation associated with the Scheme, during Construction, Demolition and Excavation (CD&E). It is anticipated that, during the lifetime of the Scheme, only a limited quantity of material assets would be required for maintenance and negligible quantities of operational waste would be produced. Material assets and waste during operation was therefore scoped out of further assessment, as stated in the Environmental Scoping Report[92]. This is in line with requirements set out in Section 3.2 of DMRB LA 110 which sets out the need to do further assessment only where a project will generate large quantities of waste.

10.1.4 Materials are defined in DMRB LA 110 as “primary, recycled / secondary and renewable sources of materials required for constructing a project”.

10.1.5 Waste is defined as per the Waste Framework Directive (2008/98/EC) as “any substance or object which the holder discards or intends or is required to discard."

10.2 Study Area

10.2.1 Two study areas have been defined for the assessment, as per DMRB LA 110. These are:

- The DCO boundary to cover Mineral Safeguarding Areas (MSA), peat resources and the reuse of waste. Within this area, materials will be consumed (used, reused and recycled) and waste will be generated; and
- The area for the supply of materials and management of waste.

10.2.2 Based on the DMRB LA 110 this second area for the supply of materials and landfill capacity and waste infrastructure will be the North West region of England for materials and Greater Manchester and Derbyshire for waste.

10.3 Methodology

10.3.1 The methodology and assessment criteria described in DMRB LA 110 will be applied for the ES.

10.3.2 Based on DMRB LA 110, the assessment is carried out using a simplified significance framework which includes Significance category descriptions (see Table 4-2, Section 4.8) which broadly reflect project influence on resource availability.

[91] https://www.standardsforhighways.co.uk/dmrb/search/6a19a7d4-2596-490d-b17b-4c9e570339e9
[92] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010034/TR010034-000008-TPUP%20-%20Scoping%20Report.pdf

10.4 Existing Environmental Conditions

10.4.1 The baseline information presented in the following sections will be used to assess the Scheme's impact and determine the significance of the effect in the ES.

Material Assets

10.4.2 The baselines for assessing the Scheme's use of material assets during construction are presented below. Table 10-1 provides a breakdown of annual sales of material assets in North West England.

Table 10-1 - Availability of material assets in North West England

Material assets	Annual sales in North West England (million tonnes)
Aggregate (crushed rock and sand & gravel)	8.76
Asphalt	2.40
Concrete (ready-mixed)	4.08
Steel (finished steel products)	1.08

Table Source: North West Aggregate Working Party report (2017), Mineral Products Association: Profile of the UK Mineral Products Industry (2018) and World Steel Association (2019) – steel sales estimated from UK-wide figure.

10.4.3 Table 10-2 presents the targets for use of recycled or secondary aggregates in construction of the Scheme. The target for North West England is 30% and therefore this will be used to assess the Scheme's aggregate use (as it is more stringent than the English target).

Table 10-2 - Recycled aggregate targets

Region	Recycled content target (alternative materials)	Total aggregate provision (million tonnes)
North West	30%	392
England (total)	25%	3,908

Table Source: Design Manual for Roads and Bridges LA 110 material assets and waste (2019).

Mineral Safeguarding Sites and Peat Resource

10.4.4 The presence of mineral safeguarding areas (MSAs) and peat resources within the first study area has been reviewed. No MSAs were identified within the Scheme's first study area comprising the main works DCO boundary.

10.4.5 However, the following areas are located within 5 km of the Scheme:

- An inactive sandstone quarry is located approximately 1 km to the west of the Scheme on Harrop Edge Road;
- The Scheme is located near sandstone identified as MSAs to the west and south; and
- MSAs for brick clay and coal are also located to the south of the Scheme.

10.4.6 A review of publicly available information indicated that there is not a peat resource within the first study area. Small areas of blanket bog and lowland fens are located

approximately 2 km north of the Scheme and to the east of Stalbridge. It is not expected that these peat resources would be sterilised the Scheme.

Waste

10.4.7 The baselines to assess against for the Scheme's generation of wastes during CD&E works are presented below. The remaining landfill capacity was estimated from Environment Agency (EA) data from 2018 and is presented in Table 10-3. As the Scheme is on the border of Greater Manchester and Derbyshire, both Waste Planning Authority (WPA) areas have been included.

Table 10-3 - Estimated remaining landfill capacity

Waste Planning Authority	Estimated remaining capacity in 2018 (cubic metres)
Greater Manchester & Derbyshire	16,893,612

Table Source: Environment Agency 2018 Remaining Landfill Capacity – Version 2 (2018).

10.4.8 The capacity of waste management infrastructure has been estimated from waste received at facilities within the Greater Manchester and Derbyshire WPAs in 2018. The baseline is broken down based on waste classification, i.e. non-hazardous or hazardous, and presented in Table 10-4.

Table 10-4 - Estimated waste management infrastructure capacity

Waste type (classification)	Estimated annual capacity (tonnes)
CD&E (non-hazardous)	1,435,819
CD&E (hazardous)	9,458
CD&E TOTAL	1,445,277

Table Source: Environment Agency Waste Data Interrogator (2018) – based on 17 coded waste received at facilities in the Greater Manchester and Derbyshire WPA areas.

10.5 Other baseline information to be obtained/surveys to be undertaken

10.5.1 The following baseline information will be obtained for the ES to determine the significance of the effects associated with material assets and wastes

- Ongoing review of relevant waste legislation, national, regional and local planning policies and guidance;
- Review the proposed construction materials, their quantities, and estimate the quantities and types of wastes to be generated during the CD&E phases. Given the nature of the Scheme, operational wastes will be limited and as such will not be assessed;
- Identify and evaluate the impacts of the Scheme against the regional demand for key construction materials, the regional CD&E waste arisings and infrastructure capacity and the regional hazardous CD&E waste arisings and national hazardous CD&E infrastructure capacity; and

- Identify opportunities to reduce, re-use, recover and/ or recycle materials and wastes through a review of the Scheme (including proposed building materials and construction methods and design, where available) and in accordance with industry best practice.

10.5.2 A ground investigation was previously undertaken as part of the Scheme and this information will be reviewed as part of the ES. This information will provide an indication of whether any soils containing hazardous substances are present within the first study area, which could contribute to the generation of hazardous waste and requirement for it to be managed or disposed.

10.6 Potential Effects and Mitigation Measures

10.6.1 The potential effects of the Scheme during construction and the measures proposed to manage them are outlined below. This presents a qualitative assessment only due to the limitation of the data availability at this stage. The complete assessment of construction stage effects of the scheme and suggested mitigation will be updated in the ES based on the design data.

Material Supply

Effects during construction

10.6.2 Throughout the construction phase there will be a reduction of material assets due to use from the Scheme.

10.6.3 It is likely this will not be significant, based on current knowledge, but this will need to be assessed further in the ES.

10.6.4 There is not likely to be a significant impact on MSA's as none of these are directly affected by the scheme, based on current knowledge, but this will need to be assessed further in the ES.

Mitigation

10.6.5 Steps will be taken during design to minimise the use of materials through efficient design and use of minimal temporary works (where safe to do so). Design will also specify the use of the largest amount of recycled content in order to minimise the use of virgin material assets.

Landfill Sites and Waste Management Infrastructure

Effects during construction

10.6.6 Throughout the construction phase there will be a reduction of landfill sites' and waste management facilities' capacity due to the CD&E waste arising from the Scheme.

10.6.7 Whilst an overall aim is to achieve a cut and fill balance, this may not be completely possible. However, it is currently understood that most of the arisings from construction are likely to be used elsewhere on site. As the design is ongoing, consideration is being given to reuse as much cut material as is safe to do so, whilst minimising the need to bring materials onto site as fill.

10.6.8 It is likely the impact on landfill site capacity will not be significant although the impact on waste management facilities could be significant, based on current knowledge, but this will need to be assessed further in the ES.

Mitigation

10.6.9 Steps will be taken during design to minimise the generation of waste through consideration of off-site manufacture of components and use of modular construction and other modern methods of construction. Discussions will also take place with the supply chain to use reusable packaging and take back unused materials. Decisions the design stage will also support the circular economy through specifications to use the target amount of recycled material (as shown in Table 10-2)

10.6.10 Impacts would be managed during construction through the implementation of an Environmental Management Plan (EMP) in accordance with DMRB LA 120, for example the appointed contractor(s) would be required to:

- Promote opportunities for the potential reuse and recycling of all material assets and waste;
- Sort and segregate waste into different waste streams (where technically and economically feasible); and
- Manage material use to maximise its reuse within the Scheme, providing an environmental benefit over off-site management.

10.6.11 The EMP would mandate several subsidiary management plans, which would form part of the suite of mitigation measures of particular relevance to materials and waste, for example the Site Waste Management Plan (SWMP).

10.6.12 The SWMP will be a live document that will evolve following the granting of development consent to enable Highways England and the appointed contractor(s) to plan, implement, monitor and review waste minimisation and diversion from landfill on the Scheme.

10.6.13 A waste to landfill diversion target would be established for the Scheme.

10.6.14 As part of the SWMP, the appointed contractor(s) would have to monitor waste arisings and management practices. Auditing and measurement would enable more effective management of waste through the setting of performance targets for recycling and segregation and monitoring waste diverted from landfill.

10.6.15 As a minimum all vegetation waste would be diverted from landfill, unless identified as an invasive species and no other options are available. The greatest opportunity for the sustainable management of vegetation waste would be through recycling into compost.

10.6.16 Hazardous wastes, including any contaminated soil would be identified, removed and kept separate from other CD&E wastes in order to avoid contaminating ‘clean’ materials.

10.6.17 Any contamination identified may require soils to be treated onsite or taken offsite for treatment and/or disposal. Any hazardous waste arising from demolition activities would be taken offsite for disposal at a suitable facility.

10.6.18 It should be noted that assessment of potential effects is ongoing and is therefore subject to change. Further detailed assessment will be provided within the ES. In

addition, mitigation measures associated with transport of materials and waste and greenhouse gas emissions are identified in their respective chapters of the PEIR.

10.7 Summary

10.7.1 This chapter has been written in accordance with DMRB LA 110 Material assets and waste.

10.7.2 It establishes two study areas (the DCO boundary and the North West of England, incorporating Greater Manchester and Derbyshire) and summarises baseline data for material asset sales, landfill void capacity and waste infrastructure capacity, which impacts of the Scheme are to be assessed against in the ES.

10.7.3 The chapter has identified several potential effects during the construction phase and sets out a number of mitigation measures to reduce these effects such as efficient design and the use of an EMP and SWMP which will be incorporated targets to divert waste from landfill and maximise recycling.

10.7.4 Whilst an overall aim is to achieve a cut and fill balance, this may not be completely possible. However, it is currently understood that most of the arisings from construction are likely to be used elsewhere on site. As the design is ongoing, consideration is being given to reuse as much cut material as is safe to do so, whilst minimising the need to bring materials onto site as fill.

10.7.5 At this stage, only a qualitative assessment has been presented due to the limitation of the data availability, which is proportional to the design information available at this stage. The complete assessment of construction stage effects of the scheme and suggested mitigation will be updated in the ES based on the design data.

10.7.6 It is confirmed in the chapter that assessment of the operational phase of the Scheme has been scoped out due to the expected minor impacts, as previously identified in the Environmental Scoping Report[93].

[93] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010034/TR010034-000008-TPUP%20-%20Scoping%20Report.pdf

11 Noise and Vibration

11.1 Introduction

11.1.1 This chapter provides the preliminary assessment for noise and vibration based on information available as of the end of September 2020. It identifies the study area, methodology, baseline conditions, and potential impacts associated with the Scheme during construction and operation. Where relevant it identifies measures recommended to mitigate any potentially significant adverse noise effects. Potential mitigation measures will be covered in much greater detail in the ES.

11.1.2 The Scheme is intended to adhere to the aims of the Noise Policy Statement for England (NPSE) and is considered with reference to the guidance contained within the National Planning Policy Framework (2019). The NPSE sets out the government's overall policy on noise. Adherence to the NPSE will be addressed during the ES assessment. The Scheme is intended to fulfil the NPSE aims to:

- Promote good health and good quality of life
- Effective management of noise
- Within the context of Government policy on sustainable development

11.1.3 The Scheme has the potential to adversely affect noise and vibration sensitive receptors in the area. DMRB, LA 111 'Noise and Vibration'[94].notes that the definition of 'Noise Sensitive Receptor' is simply '*receptors which are potentially sensitive to noise'.* Any areas of designated tranquillity in proximity to the Scheme will also be identified during the ES assessment. A distinction is also made between 'dwellings' and 'other noise sensitive receptors', which may include:

- Hospitals;
- Healthcare facilities;
- Education facilities;
- Community facilities;
- Environmental Noise Directive (END) quiet areas[95] or potential END quiet areas;
- International and national or statutorily designated sites; and
- Public rights of way and cultural heritage assets.

11.2 Study Areas

Construction

11.2.1 There exists a reasonable stakeholder expectation for a construction noise & vibration assessment as per DMRB, LA 111. The study area for construction noise impacts typically encompasses a 300 m buffer from the physical works associated with the Scheme as per DMRB LA 111. The requirement within DMRB LA 111 is

[94] https://www.standardsforhighways.co.uk/dmrb/search/cc8cfcf7-c235-4052-8d32-d5398796b364
[95] Quiet areas outside cities as those areas delimited by national authorities that are undisturbed by noise from traffic, industry or recreational activities.

based upon on guidance contained within BS 5228-1, 'Code of practice for noise and vibration control on construction and open sites - Part 1: Noise'. Construction plant lists and a draft schedule of works are not currently available. The effects of construction noise will therefore be assessed as part of the ES.

Construction Haulage Routes

11.2.2 As per the DMRB LA 111, the construction traffic study area is established using a 50 m width from the kerb line of public roads with the potential for an increase in the basic noise level (BNL) of 1 dB(A) or more as a result of the addition of construction traffic to existing traffic levels. Guidance on the identification of suitable haulage routes is contained within BS 5228-1. Haulage routes are not currently identified and will be assessed as part of the ES.

Construction Diversion Route

11.2.3 As per the DMRB LA 111, where full carriageway closures are in place during the night (23:00-07:00) to enable construction works, a diversion route study area is established using a width of 25 m from the kerb line of the diversion route. Whether night works are required is unknown at this stage, however night works are anticipated. Potential diversion routes may give rise to significant adverse effects, however they are not currently identified and will be assessed as part of the ES.

Vibration

11.2.4 As per the DMRB LA 111, a vibration study area of 100 m from the closest construction activity with the potential to generate vibration is typically sufficient to encompass all vibration sensitive receptors. Potential vibration effects will be assessed as part of the ES.

Operation

11.2.5 There exists a reasonable stakeholder expectation for an operational noise assessment, as per DMRB LA 111. An operational study area is defined as being within 600 m of new road links or road links physically changed or bypassed by the Scheme. The effect of the Scheme is to bypass frequently congested portions of the A57 and Woolley Lane. A study area for the operational assessment is shown in Volume 3 Figure 11.1. As with all study areas for the noise and vibration assessment, the operational study area can be modified to encompass local considerations following consultation with stakeholders for use in the ES assessment.

11.2.6 'Wider area' short-term noise changes have been identified along arterial routes outside of the 600 m operational study area. In accordance with the DMRB LA 111, the study area for these locations is defined as being within 50 m of roads predicted to experience a perceptible change in noise upon the planned opening of the Scheme. This includes a small portion of the Peak District National Park. Short-term changes can include both beneficial and adversely affected routes and are to be assessed within the ES.

11.3 Methodology

11.3.1 Sensitive receptors have been identified using Ordnance Survey Address Base Plus data. Further consultation is required with stakeholders to identify any additional receptors or receptors that are considered to be of high importance for the purposes of the ES assessment. Prior to consultation, all receptors are assumed to be 'highly sensitive'. This may be amended following consultation for the purposes of the ES.

Construction

11.3.2 The calculation of construction noise levels will follow the methodology in BS 5228-1. The predicted noise levels from construction noise sources will be compared against the assessment criteria shown in the DMRB. These assessment criteria are influenced by the existing baseline noise levels. Baseline noise levels are ascertained using a combination of:

- Strategic noise mapping (Defra)
- Baseline noise survey data (see below, 11.4)

11.3.3 Noise sources that are considered during the assessment include:

- Construction plant in use on the project;
- Construction compounds; and
- Traffic on haul roads not part of the public highway.

11.3.4 The results of the construction noise calculations will inform a dB $L_{Aeq,T}$ value. This is applied to the assessment criteria. This includes the identification of the lowest observed adverse effect level (LOAEL) and significant observed adverse effect level (SOAEL) to determine the significance of any noise impact. A perceptible level of construction noise would be equal to or greater than the LOAEL value ascribed to a receptor. Table 11-1 below details the source of LOAEL and SOAEL values pertinent to construction noise.

Table 11-1 - Construction noise LOAEL and SOAEL values

Time Period	LOAEL	SOAEL
Day (0700-1900 weekday & 0700-1300 Saturdays)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS 5228-1 Section E3.2 and Table E.1 BS 5228-1
Night (2300-0700)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS 5228-1 Section E3.2 and Table E.1 BS 5228-1
Evening and weekends (time periods not covered above)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS 5228-1 Section E3.2 and Table E.1 BS 5228-1

*Table source: Table 3.12, DMRB LA 111

11.3.5 As per DMRB LA 111, LOAEL values are determined using baseline noise levels. Where appropriate, the baseline noise level is identified using either baseline noise survey data or by the use of strategic noise mapping published by Defra, or a combination of both of these sources.

11.3.6 SOAEL values will be identified using the ABC methodology outlined in BS 5228-1 (Section E3.2). Using the ABC method (see below, Table 11-2), SOAEL values are generated when ambient noise levels are identified and characterised for daytime, evening, and night-time periods. A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the works exceeds the threshold level for the category appropriate to the ambient noise level.

Table 11-2 - The ABC method, BS5228-1

Assessment category and threshold value period	Threshold value, in decibels (dB) ($L_{Aeq,T}$)		
	Category A[A)]	Category B[B)]	Category C[C)]
Night-time (2300 – 0700)	45	50	55
Evenings and weekends [D)]	55	60	65
Daytime (0700-1900) and Saturdays (0700 - 1300)	65	70	75

Note 1 A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.

Note 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise.

Note 3 Applied to residential receptors only.

A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

D) 1900-2300 weekdays, 1300-2300 Saturdays and 0700-2300 Sundays

11.3.7 Once LOAEL and SOAEL values have been identified the magnitude of any potential noise impact is then assessed. To assess the magnitude of impact for construction noise at a given receptor reference is made to DMRB LA 111, Table 3.16. ‘Minor’ magnitudes of impact are considered to represent the threshold of perceptibility (see Table 11.3 below).

11.3.8 Construction traffic basic noise level (BNL) changes shall be calculated for roads within the construction traffic study area using the methodology found in the ‘Calculation of Road Traffic Noise’, 1988 (CRTN).

11.3.9 Pivoted traffic data used in this assessment contains the following components:

- 18-hour annual average weekday traffic (AAWT) flow;
- 18-hour average speed (kph); and
- Percentage HGV content of total 18-hour AAWT flow.

11.3.10 Information on road surfacing options considered for the Scheme is not yet available. Consequently, for the purposes of this initial model, all road surfaces have been assumed to consist of hot rolled asphalt (HRA). This requires surface corrections of -0.5 dB for all roads that have pivoted speeds greater than or equal to 75 kph, and corrections of -1 dB for all roads that have pivoted speeds less than 75 kph. For the ES, all roads will receive surface corrections in accordance with DMRB LA 111 (Appendix A2), including the anticipated use of low noise road surfacing on the new sections of road planned. For the ES, on roads where speeds are predicted to be greater than 75 kph on low noise road surfacing, a correction of -3.5 dB will be applied.

11.3.11 Reference is made to DMRB LA 111 (Table 3.17) to identify the magnitude of impact on receptors. This is also included in Table 11-3 below.

Table 11-3 - Magnitude of impact and construction noise descriptions

Magnitude of Impact	Construction Noise Level (L_{Aeq})	Change in Construction Traffic Noise Level ($L_{A10,18h}$)
Major	Above or equal to SOAEL +5dB	Greater than or equal to 5 dB
Moderate	Above or equal to SOAEL and below SOAEL +5dB	Greater than or equal to 3 dB and less than 5 dB
Minor	Above or equal to LOAEL and below SOAEL	Greater than or equal to 1 dB and less than 3 dB
Negligible	Below LOAEL	Less than 1 dB

Table Source: Reproduced from Tables 3.16 & 3.17, DMRB LA 111

11.3.12 A significant effect is determined for construction noise, or construction traffic noise, where a major or moderate magnitude of impact will occur for either

- 10 or more days or nights in any 15 consecutive days or nights, or
- a total number of days exceeding 40 in any 6 consecutive months.

Vibration

11.3.13 Predictions on the level of vibration will be made in accordance with the methodology found in BS 5228-2, 'Code of practice for noise and vibration control on construction and open sites. Vibration ' as prescribed by the DMRB LA 111. The significance of potential impacts shall be ascertained using the methodology contained in DMRB LA 111, which takes into account the magnitude of the vibration and whether threshold levels for the LOAEL or SOAEL are exceeded. Table 11-4 below shows the vibration LOAEL and SOAEL values determined by DMRB LA 111.

Table 11-4 - Construction vibration LOAELs and SOAELs for all receptors

Time Period	LOAEL	SOAEL
All time periods	0.3 mm/s PPV	1.0 mm/s PPV

Table source: Reproduced from Table 3.31, DMRB LA 111

11.3.14 To assess the magnitude of impact of construction vibration reference is made to DMRB LA 111, Table 3.33 . This is reproduced below in Table 11-5.

Table 11-5 - Magnitude of impact of vibration levels

Magnitude of Impact	Vibration level
Major	Above or equal to 10 mm/s PPV
Moderate	Above or equal to SOAEL and below 10 mm/s PPV
Minor	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL

*Table source: Table 3.33, DMRB LA 111

11.3.15 A significant effect attributed to construction vibration is likely where it is determined that a major or moderate magnitude of impact shall occur for either:

- 10 or more days or nights in any 15 consecutive days or nights
- A total number of days exceeding 40 in any 6 consecutive months

Operation

11.3.16 As part of an operational assessment it is necessary to consider road traffic noise change experienced by receptors resulting from the Scheme in both the short and long-term. At this stage, changes are considered between the:

- 'Do Minimum Opening Year' scenario (where the Scheme is assumed not to be built), and;
- 'Do Something Opening Year' scenario (with the Scheme in place);
- 'Do Something Future Year' scenario (1with the Scheme in place, 15 years after it has opened).

11.3.17 The full scope of the assessment will be presented in the ES.

11.3.18 The following comparisons of predicted road traffic noise are presented in this document to consider the potential impacts of the Scheme.

- Do Minimum Opening Year vs Do Something Opening Year; and
- Do Minimum Opening Year vs Do Something Future Year

11.3.19 To carry out these comparisons, road traffic noise calculations were undertaken in accordance with the CRTN prediction. This allows the calculation of dB $L_{A10,18\text{-hour}}$ values for road traffic noise contribution and the generation of noise change contours within the study.

11.3.20 Operational noise LOAEL and SOAEL values are provided below in Table 11.6.

Table 11-6 - Operational LOAEL and SOAEL values

Time Period	LOAEL	SOAEL
Day (0600-0000)	55 dB $L_{A10,18hr}$ facade	68 dB $L_{A10,18hr}$ facade
Night (2300-0700)	40 dB $L_{night,outside}$ (free-field)	55 dB $L_{night,outside}$ (free-field)

Table source: Reproduced from Table 3.49.1, DMRB LA 111

11.3.21 To assess the magnitude of impact of operational road noise reference is made to DMRB LA 111, Tables 3.54a and 3.54b. These are reproduced below in Tables 11.7 and 11.8.

Table 11-7 - Operational road noise short-term magnitude of change

Magnitude of Impact	Short-term noise change (dB $L_{A10,18hr}$ or L_{night})
Major	Greater than or equal to 5 dB
Moderate	3 to 4.9 dB
Minor	1 to 2.9 dB
Negligible	Less than 1 dB

Table 11-8 - Operational road noise long-term magnitude of change

Magnitude of Impact	Long-term noise change (dB $L_{A10,18hr}$ or L_{night})
Major	Greater than or equal to 10 dB
Moderate	5 to 9.9 dB
Minor	3 to 4.9 dB
Negligible	Less than 3 dB

11.3.22 The DMRB LA 111 states that moderate and major adverse impacts are to be considered as potential significant adverse effects as part of an initial assessment. Final operational significance is determined with reference to contextual factors. This process requires the assessor to consider a number of holistic points related to the receptor and the wider environment before determining whether a significant adverse effect has arisen (see Table 11-9 below).

Table 11-9 - Additional criteria for determining operational significance of effect

Magnitude of Impact	Long-term noise change (dB $L_{A10,18hr}$ or L_{night})
Noise level change (is the magnitude of change close to the minor/moderate boundary?)	Noise level changes within 1 dB of the top of the 'minor' range can indicate that it is more appropriate to determine a likely significant effect. Noise level changes within 1 dB of the bottom of a 'moderate' range can indicate that it is more appropriate to consider a change is not a likely significant effect.
Differing magnitude of impact in the long term to magnitude of impact in the short term	1) Where the long term impact is predicted to be greater than the short term impact, it can be appropriate to conclude that a minor change in the short term is a likely significant effect. Where the long term impact is predicted to be less than the short term it can be appropriate to conclude that a moderate or major change in the short term is not significant. 2) A similar change in the long term and non-project noise change can indicate that the change is not due to the project and not an indication of a likely significant effect.

Magnitude of Impact	Long-term noise change (dB $L_{A10,18hr}$ or L_{night})
Absolute noise level with reference to LOAEL and SOAEL (by design this includes sensitivity of receptor)	1) A noise change where all do-something absolute noise levels are below SOAEL requires no modification of the initial assessment. 2) Where any do-something absolute noise levels are above the SOAEL, a noise change in the short term of 1.0dB or over results in a likely significant effect.
Location of noise sensitive parts of a receptor	1) If the sensitive parts of a receptor are protected from the noise source, it can be appropriate to conclude a moderate or major magnitude change in the short term and/or long term is not a likely significant effect. 2) Conversely, if the sensitive parts of the receptor are exposed to the noise source, it can be more appropriate to conclude a minor change in the short term and/or long term is a likely significant effect. 3) It is only necessary to look in detail at individual receptors in terms of this circumstance where the decision on whether the noise change gives rise to a significant environmental effect is marginal.
Acoustic context	If a project changes the acoustic character of an area, it can be appropriate to conclude a minor magnitude of change in the short term and/or long term is a likely significant effect.

Table source: Reproduced from Table 3.60, DMRB LA 111

11.3.23 The DMRB LA 111 advises that the threshold of perceptibility for change in operational road noise is 1dB $L_{A10,18hr}$ in the short-term and 3dB $L_{A10,18hr}$ in the long-term (typically 15 years from the planned opening of a Scheme).

11.3.24 At this stage, road noise contour plots have been calculated using the commercially available 3D noise modelling software Noisemap, which has been validated to follow the prediction procedures set out in CRTN as amended by DMRB LA 111. A spatially coarse model has been produced which does not account for topography or vertical alignment. It is anticipated that the resultant road traffic noise levels (and their impacts) would be lower than presented within this PEIR once the effects of topography (bunds, cuttings) have been taken into account during the noise modelling process. Detailed topographical modelling will be available for the ES assessment.

11.3.25 An appraisal of potential claimants assessed under the criteria contained within the Noise Insulation Regulations 1975 (NIR) is not considered in this preliminary assessment. Receptors that may potentially qualify under the NIR, i.e. dwellings that experience road noise levels greater than or equal to 68 dB and are shown to experience an increase of at least 1 dB due to the Scheme, will be identified in the ES.

11.4 Existing Environmental Conditions

11.4.1 Strategic noise mapping information (Defra), aerial photography, site visits, and baseline/ambient noise monitoring have all been used to derive existing environmental conditions for the Scheme.

11.4.2 The dominant source of noise in the proximity of the Scheme is road traffic noise. Noise emissions from vehicles traveling along (from east to west) the B6174, A6018, A57, and A628 heavily influence the noise climate of the area.

11.4.3 There are existing residential receptors located towards the western end of the Scheme, in Hattersley; centrally where the Scheme passes through Mottram, and at the eastern extreme of the Scheme in Woolley and Hollingworth. Isolated dwellings on B roads are also present around the Scheme.

11.4.4 'Other noise sensitive receptors' identified across the study area are provided below in Table 11-10.

Table 11-10 - Other noise sensitive receptors identified within the study area

Address	Postcode
Longdendale Hollingworth Youth Club, Cannon Street	SK14 8LR
The Old Chapel, Spring Street	SK14 8NQ
Woodland off Carrhouse Lane	SK13 6JQ
Tree Adjacent to Grove House, Water Lane	SK13 2NS
St Charles Roman Catholic Primary School, The Carriage Drive	SK13 1PJ
9 Shepley Street	SK13 6JG
Centre Stage Dance Crew, 2 Woolley Bridge Road	SK13 2NR
Communal Yard Behind 2 to 15 Old Road, Old Hall Lane	SK14 6LU
Doctors Surgery, 27 Awburn House, Mottram Moor	SK14 6LA
Field North of Matley Castle, Harrop Edge Road	SK14 3AR
Playground, Broadbottom Road	SK14 6JB
Mottram Church of England Primary School, Warhill	SK14 6JL
The Mudd, Littlemoor Road	SK14 6JN
Field Behind 22 to 60 Hyde Road	SK14 6NG
Premier Inn, Stockport Road	SK14 3AU
Arundale Primary School, John Kennedy Road	SK14 6PW
Communal Yard to the Rear of 38 to 48 Stalybridge Road, Back Moor	SK14 6NE
Open Land in Front of 7 Cheriton Close	SK14 3DQ
The Hub, Stockport Road	SK14 6AF
Playground Adjacent to Public House, Ashworth Lane	SK14 6QW
Open Land in Front of 10 Cheriton Close	SK14 3DQ
Open Land in Front of 18 Cheriton Close	SK14 3DQ

Address	Postcode
Horeb Baptist Church, Melandra Crescent	SK14 3RB
Southern Strip of Chapman Field Football Pitch Between Broadbottom Road and Ashworth Lane	SK14 6PY
Land Adjacent to Mottram Moor Farm, Mottram Moor	SK14 6LD
Cricket Ground and Premises, Broadbottom Road	SK14 6JA
Community Hall, Chambers Court	SK14 6SU
Total Adrenaline, Manley Grove	SK14 6PJ
Parish Church of St. Michael & All Angels, Warhill	SK14 6JL
Open Land Next to 11 Cheriton Close	SK14 3DQ
Hattersley Primary Care Centre, Hattersley Road East	SK14 3EH
Etherow Industrial Estate, Woolley Bridge Road	SK13 2NS
Hollingworth Liberal Club, Market Street	SK14 8LN
Hollingworth Conservative Club, 113 Market Street	SK14 8HY
8A The Cattery, Coach Road	SK14 8LY
Hollingworth Clinic, Market Street	SK14 8HW
Hollingworth Primary School, Market Street	SK14 8LP
Longdendale Community Language College, Spring Street	SK14 8LW
Harrop Edge Quarry Site, Harrop Edge Road	SK14 6SJ

11.4.5 Four Noise Important Areas (NIAs) are in proximity of the Scheme. An NIA is where the 1% of the population that are most affected by the highest noise levels from major roads and railways are located according to the results of strategic noise mapping.

11.4.6 Round 3 of the strategic noise mapping data set was published in 2019, and has previously been undertaken by Defra under the terms of The Environmental Noise (England) Regulations 2006. As mentioned above, the threshold for perceptible noise change is 1 dB. In NIAs, a perceptible change in road noise would likely constitute a significant effect and require mitigation.

11.4.7 The locations of the four NIAs identified are presented in Volume 3 Figure 11.1 and are detailed as:

- Defra NIA ref: 1574, located along the M67;
- Defra NIA ref: 10992, located along the A57;
- Defra NIA ref: 10993, located along the A57; and
- Defra NIA ref: 1575, located along the A6018.

Baseline Noise Monitoring Completed to Date

11.4.8 Baseline noise monitoring surveys have previously been carried out by Arcadis during June/July 2018. The surveys were carried out in accordance with BS 7445 2003 ‘Description and measurement of environmental noise’ (BS 7445) and followed the

measurement protocol contained within the CRTN[96]. This method requires the measurement of data between the hours of 06:00 and 00:00 to determine a dB $L_{10,18hr}$ noise level.

11.4.9 Class 1 noise level meters were used during the surveys, namely a 01dB Fusion and Rion NL-52. Noise meters were set up at a height of 1.5 m and left in situ for approximately seven days, with localised meteorological observations recorded by accompanying weather stations. Favourable weather conditions in compliance with DMRB LA 111 were observed throughout the surveys.

11.4.10 All noise measurement locations are assumed to be measured in the open, without any reflections from nearby surfaces except the ground ("free-field" conditions). Observations on the prevailing noise climate were made during the set up and collection of the sound level meters. The noise monitoring locations (NML) are presented in Volume 3 Figure 11.1 and are detailed as follows;

- NML 1 - Located in the rear garden of number 44 Hyde Road. Road noise was audible, but not always audible over other extraneous noise sources;
- NML 2 - Located in the rear garden of number 24 Four lanes. Road noise was not audible over other extraneous noise sources;
- NML 3 - Located in the rear garden of number 14 Edge Lane. Road noise was not audible over other extraneous noise sources;
- NML 4 - Located in the rear garden of number 41 Lodge Court. Road noise was not audible over other extraneous noise sources;
- NML 5 - Located in the rear garden of number 103 Mottram Moor. Road noise was dominant over any other noise source;
- NML 6 - Located in the rear garden of number 8 Carrhouse Lane. Road noise was not audible over other extraneous noise sources;
- NML 7 - Located approximately 12m from Tara Brook Farm in an adjoining land parcel. Road noise was occasionally audible over other extraneous noise sources;
- NML 8 - Located in the rear garden of Carr House Farm. Road noise was not audible over other extraneous noise sources; and
- NML 9 - Located in the rear garden of number 1 Tollemache Close. Road noise was dominant over any other noise source.

11.4.11 A summary of the monitored noise survey data is presented below in Tables 11-11 and 11-12.

Table 11-11 - Summary of survey data pertinent to operational noise

Noise Monitoring Location	Mon – Fri (06:00 – 00:00) as per CRTN (1988), DMRB LA 111		
	dB $L_{A10,18hr}$	dB $L_{A90,18hr}$	dB $L_{max,18hr}$
NML 1	51.0	43.9	81.7

[96] http://www.devon.gov.uk/core-doc-n3-calculation-of-road-traffic-noise.pdf

Noise Monitoring Location	Mon – Fri (06:00 – 00:00) as per CRTN (1988), DMRB LA 111		
	dB $L_{A10,18hr}$	dB $L_{A90,18hr}$	dB $L_{max,18hr}$
NML 2	48.2	40.0	93.2
NML 3	50.4	43.1	73.4
NML 4	48.7	37.0	75.0
NML 5	56.0	47.1	82.2
NML 6	49.5	42.2	96.5
NML 7	48.9	41.4	81.9
NML 8	46.6	34.2	80.1
NML 9	49.2	40.5	83.0

Table 11-12 - Summary of survey data pertinent to construction noise

Noise Monitoring Location	Day 07:00 – 19:00 (Mon – Fri) 07:00 – 13:00 (Sat) As per BS 5228, DMRB LA 111	Night 23:00 – 07:00 As per BS 5228, DMRB LA 111	Evening & Weekends (i.e. all other time periods) As per BS 5228, DMRB LA 111
	dB $L_{Aeq,T}$	dB $L_{Aeq,T}$	dB $L_{Aeq,T}$
NML 1	49.3	46.9	54.7
NML 2	49.8	46.9	47.1
NML 3	50.4	47.8	56.2
NML 4	48.6	46.8	47.2
NML 5	54.1	51.7	52.6
NML 6	53.8	46.1	53.8
NML 7	48.4	45.5	48.0
NML 8	46.6	43.8	46.2
NML 9	50.6	49.9	50.8

11.5 Other Baseline Information to be Obtained/Surveys to be Undertaken

11.5.1 Currently Annual Average Weekday Traffic data (AAWT) is available over an 18-hour period for the Do Minimum and Do Something scenarios for the opening and future years. The assessment of impacts arising from haul routes to and from the Scheme construction area will require AAWT that also includes planned construction vehicle movements. Pivoted speed data, total traffic flow, and the percentage of HGV vehicles is required for this task.

11.5.2 AAWT data is not required for the assessment of any anticipated diversion routes. DMRB LA 111 states that:

"It is possible to calculate changes in noise levels due to diversion routes, but it is not a proportionate approach, as it would require significant work in additional traffic modelling and noise calculations that would be highly likely to confirm that disturbance would occur."

11.5.3 Presently, nine long-term baseline noise surveys have been conducted in the area of the Scheme. The locations of the concluded surveys are considered to be representative of key areas of interest in the locale of the Scheme. Additional attended baseline/ambient noise surveys may be required on an ad hoc basis in support of the ES. There exists a reasonable stakeholder expectation that these data sources be used in conjunction with strategic noise mapping to identify baseline noise levels.

11.5.4 Should further baseline noise surveys be required, the specifics of the survey locations and durations will be agreed with both High Peak District Council and Tameside MBC where appropriate prior to monitoring being undertaken.

11.5.5 Defra strategic road and rail noise mapping will be considered to establish baseline noise levels of the wider area if it is considered that the data gathered during the baseline noise surveys requires supplementary detail.

11.5.6 A prediction of the existing and future road traffic noise levels within the locale of Scheme will be undertaken as part of the ES assessment. Predictions will be made using industry standard 3D noise modelling software and traffic data modelled by BBA for the Preliminary Design stage in 2020. The prediction methodology will be in accordance with both CRTN and DMRB LA 111.

11.6 Potential Effects and Mitigation Measures

11.6.1 The potential effects of the Scheme, during both construction and operation, and the measures proposed to manage them are outlined below.

11.6.2 The assessment has been based upon data relating to both the construction and operational phases of the Scheme and design work undertaken to date. Therefore, it should be noted that assessment of potential effects is ongoing and is subject to change. Further detailed assessment will be provided within the ES.

Effects during construction

11.6.3 There is potential for short-term significant adverse noise and vibration effects during the Scheme construction phase. It is anticipated that construction noise effects could occur due to the following aspects:

- Noise from the operation of construction plant;
- Noise from the construction of the Mottram Underpass; and
- Noise from HGV movements to and from the site, for example site deliveries and the removal of spoil.
- Noise from diverted traffic.

11.6.4 It is anticipated that construction vibration effects could occur due to the following construction activities:

- Percussive piling activities; and

- Vibratory piling activities.

11.6.5 Rotary bored piling operations are considered to have inherently low vibration levels, even at close proximity, and it is unlikely that any adverse effects from this type of piling activity would occur.

11.6.6 At present a schedule of works is not in place. It is assumed that any significant construction works would be undertaken during the daytime only. Discrete packages of work to tie in the new Scheme to the existing road network may be required during night-time periods, however these are anticipated to be of a short duration.

11.6.7 Throughout the construction phase, levels of construction noise and vibration will vary greatly as a result of the transient nature of the works. Impacts at any one specific receptor are likely to be evident for a limited period as the works progress.

11.6.8 As part of the ES, a detailed predictive construction noise and vibration assessment will be undertaken, based on Scheme specific construction information and in accordance with BS5228: 2009+A1:2014 Parts 1 and 2. The assessment will consider appropriate construction noise and vibration limits, potential construction noise, and vibration generation and specific mitigation measures. where deemed necessary

Mitigation during construction

11.6.9 As a minimum, mitigation measures utilised will include Best Practical Means (BPM), as outlined in BS-5228.

11.6.10 Possible mitigation measures may include:

- The use of a Traffic Management Plan to minimise any adverse effects from construction traffic flows
- Installing appropriate fencing around the construction areas likely to generate noise;
- Providing contact details for a site representative in the event that disturbance due to noise or vibration from the construction works occurs; ensuring that any complaints are dealt with pro-actively and that subsequent resolutions are communicated to the complainant;
- Keeping site access routes in good condition and well maintained with no potholes or other significant surface irregularities;
- Turning off plant machinery when not in use;
- Maintaining all vehicles and mobile plant such that loose body fittings or exhausts do not rattle or vibrate;
- Using silenced equipment where possible, in particular silenced power generators and pumps;
- Using the most modern equipment available where possible and maintaining and operating equipment properly by trained staff;
- Locating static noisy plant, including generators, as far away from noise sensitive receptors as is feasible for the particular activity;

- Ensuring that the quietest plant and equipment, techniques and working practices available are selected and used; and
- No music or radios would be played on site.

11.6.11 Methods utilised for mitigating construction noise and vibration would be implemented through the Environmental Management Plan (EMP) in accordance with DMRB LA 120.

Effects during operation

11.6.12 Short-term impacts are considered to be evident at the immediate point of opening to traffic and for the duration of the first year following opening. Long-term impacts are considered to be evident for the lifetime of the Scheme following initial opening to traffic and are based on worst case traffic flows within 15 years of opening.

11.6.13 For the short-term assessment, in the Do Minimum Opening Year scenario there are 1557 receptors that are predicted to experience road noise levels above or equal to the SOAEL, and 267 of these are predicted to be lower than the SOAEL in the Do Something Opening Year scenario. In the Do Something Opening Year scenario, 1416 receptor points are predicted to experience road noise levels above or equal to the SOAEL. Within these are 453 receptors that are predicted to experience a noise change greater than or equal to 1 dB. Of these, 126 receptors are predicted to be elevated from below the SOAEL threshold to above or equal to the SOAEL. These changes will be further investigated in the ES

11.6.14 For the long-term assessment, in Do Minimum Opening Year scenario there are 1618 receptors that are predicted to experience road noise levels above or equal to the SOAEL, and 227 of these are predicted to be lower than the SOAEL in the Do Something Future Year scenario. In the Do Something Future Year scenario, 1561 receptor points are predicted to be above or equal to the SOAEL. Within these are 697 receptors that are predicted to experience a noise change greater than or equal to 1 dB. Of these, 155 receptors are predicted to be elevated from below the SOAEL threshold to above or equal to the SOAEL. These changes will be further investigated in the ES.

11.6.15 The information presented below in Table 11-13 is derived from the road traffic noise change contour plots presented in Volume 3 Figures 11.2 and 11.3. The change contours are presented at four metres above ground level.

11.6.16 Operational noise from the Scheme has the potential to impact upon receptors in the surrounding area. The nature of this effect will be dependent on the location of the receptor and its proximity to the new route, and the existing road network.

11.6.17 DMRB LA 111 defines a change in road traffic noise of 1dB $L_{A10,18\ hour}$ in the short-term as the smallest perceptible change. DMRB LA 111 defines a change in road traffic noise of 3dB $L_{A10,18\ hour}$ in the long-term as the smallest perceptible change. Volume 3 Figures 11.2 and 11.3 display the short-term and long-term noise change contours respectively where perceptible changes in road traffic noise level may occur.

11.6.18 Based upon the information presented in Volume 3 Figures 11.2 and 11.3, areas that are predicted to experience perceptible road traffic noise changes are described in Table 11-13.

Table 11-13 - Predicted perceptible increases and decreases in road noise by area (short-term)

Area	Description	Short-term / Long-term	Increase / Decrease
Mottram	Along the entirety of the new link road. It is noted that the proposed route is not densely populated, with the exception of dwellings in the vicinity of the Mottram underpass;	Short-term	Increase
Hattersley / Godley / Kingston	M67, west of the Hattersley Roundabout. The east and west bound carriageway are predicted to experience a 50% and 30% increase in traffic flow (respectively) as a result of the Scheme;	Short-term	Increase
Hattersley	Underwood Road, west of the A560. This road is predicted to experience a 10% uplift in road traffic, contributing to a short-term increase greater than 1dB upon the Scheme opening. It is currently predicted that this effect will be considered to be negligible by the assessment Future Year;	Short-term	Increase
Hattersley	Hattersley Road, south of Underwood Road. This stretch of road has a relatively low flow of traffic, though experiences an approx. 10% uplift in traffic flow as a result of the Scheme. It is currently predicted that this effect will be considered to be negligible by the Future Year;	Short-term	Increase
Mottram	B6174, south of A57. A stretch of the B6174 is currently predicted to experience an adverse increase in road noise greater than or equal to 1dB between the A57 and Ashworth Lane/Church Brow. This increase is attributed to a predicted 130% increase in traffic flow; and	Short-term	Increase
Woolley Bridge / Brookfield	A57, Wooley Bridge, south of junction between Woolley Bridge Road and Woolley Lane. This effect is attributable to an approx. 30% uplift in traffic as a result of the Scheme. It is currently predicted that this effect will be considered to be negligible by the Future Year.	Short-term	Increase
Mottram / Woolley Bridge	Along the majority of the bypassed A57 between the M67 junction 4 (to the west), through the Hyde road/Stalybridge Road intersection at Mottram and to the new junction at the eastern end of the new Link Road; and	Short-term	Decrease
Mottram	Reductions in road traffic noise are also evident on other roads in and around Mottram including A560 (south of A57), the	Short-term	Decrease

Area	Description	Short-term / Long-term	Increase / Decrease
	A6018, and Ashworth Lane as a result of redistribution of traffic across the new link.		
Hattersley / Mottram / Woolley Bridge / Brookfield	Close proximity to the length of the Scheme	Long-term	Increase
Mottram	B6174, south of A57. Sporadic portions of the B6174 are currently predicted to experience an adverse increase in road noise greater than or equal to 3dB between the A57 and Ashworth Lane/Church Brow. This increase is attributed to a predicted 130% increase in traffic flow.	Long-term	Increase
Hattersley / Mottram	A57, between Hattersley Roundabout and the junction of A6018	Long-term	Decrease
Woolley Bridge	Woolley Lane, south of A57.	Long-term	Decrease
Peak District National Park	Within 50 metres of the carriageway between A57 Glossop and the Hagglee area, an increase in the road BNL is predicted. This is considered imperceptible in the long-term.	Short-term	Increase
NIA 1574	There exists the potential for a perceptible adverse change in noise as a result of flow distribution along the M67. This NIA may require mitigation and this will be considered further in the ES	Short-term	Increase
NIA 1575	No perceptible short-term change;	Short-term	Neither
NIA 10992	Largely beneficial for the entire length of this area including the A57 and A6018 sections. There exists the potential for perceptible adverse changes and this area may require consideration for mitigation in the ES	Short-term	Decrease / Potential increase
NIA 10993	Adverse effects along within this area are currently predicted as a result of increased traffic flows.	Short-term	Increase
NIA 1574	No perceptible long-term change	Long-term	Neither
NIA 1575	No perceptible long-term change	Long-term	Neither
NIA 10992	Largely beneficial for the entire length of this area including the A57 and the A6018 sections. There is potential for a perceptible adverse change in the vicinity of the new A57 roundabout.	Long-term	Decrease / Potential increase
NIA 10993	Mostly no perceptible change.	Long-term	Potential increase

11.6.19 Any perceptible increase in road noise in NIAs would be considered to be a significant adverse effect. As a result of the potential impacts of the Scheme relating to both sensitive receptors and NIAs, noise mitigation may need to be incorporated into the design and be considered in the ES.

Mitigation during operation

11.6.20 The information presented within Volume 3 Figures 11.2 and 11.3 and discussed above is based upon a wholly unmitigated scenario. It is also reiterated that ground contour data has not been considered at this stage. Natural topography, as well as planned cuttings and embankments for the Scheme, will have a dramatic effect on the prevailing noise climate of the area.

11.6.21 Through the EIA process additional mitigation will be considered and incorporated where necessary and reported through the ES. Measures such as low noise road surfacing, speed limits, and environmental noise barriers will be considered in the ES. Barriers can take the form of either earth mounding or acoustic fencing of various types, or a combination of the two.

11.6.22 DMRB LA 111 states the following regarding noise mitigation:

> *"The suitability of each potential mitigation measure for use within the project area shall be determined based on the following criteria:*
>
> *1) for residential noise receptors only, a comparison of the monetised noise benefit of a mitigation measure against the cost of the measure over the anticipated design life of the project;*
>
> *2) the likely perceived benefit of the measure at any noise sensitive receptors;*
>
> *3) the benefit of a measure in terms of elimination of likely significant effects;*
>
> *4) practicality of the measure, for example, in terms of safety considerations and engineering constraints;*
>
> *5) the impact of the measure across other environmental factors, for example the visual impact of a noise barrier."*

1.1.1 As such mitigation measures cannot be considered for noise in isolation and will assessed in conjunction with other topics throughout the EIA process.

11.7 Summary

11.7.1 This chapter has identified the study areas, methodology, baseline conditions, and some potential impacts associated with the Scheme during construction and operational phases. Several mitigation measures have been discussed.

11.7.2 Preliminary noise contour plots have been generated to identify any potential issues arising from operational noise in both the opening and future year of the forthcoming ES assessment. The noise contour plots are based on data that will be revised prior to the ES assessment.

11.7.3 The preliminary noise contour plots show potential adverse significant impacts at a large number of noise sensitive dwellings in both the opening and future years. Reductions in road noise levels are anticipated on the bypassed routes in both the short and long-term.

11.7.4 The preliminary noise contour plots do not take into account either the natural topography of the area, cuttings and embankments designed as part of the Scheme, nor the vertical alignment of the existing roads or Scheme. As a result, it is considered that the ES assessment will yield considerably fewer significant areas of adverse impacts in both the short and long-term than those shown in Volume 3 Figure 11.2 and 11.3.

11.7.5 This chapter provides the preliminary assessment for noise and vibration based on information available as of the end of September 2020. It identifies the study area, methodology, baseline conditions, and potential impacts associated with the Scheme during construction and operation. Where relevant it identifies measures recommended to mitigate any potentially significant adverse effects.

12 Population and human health

12.1 Introduction

12.1.1 European Directive 3011/92/EU, as amended by European Directive 2014/52/EU, requires Environmental Statements to include, among other topics, assessment of potential effects upon population and human health, including potential impacts/effects on physical, mental and social wellbeing. This chapter has been prepared in accordance with best practice, professional judgement, the Highways England and Design Manual for Roads and Bridges (DMRB) LA 112 Population and Human Health[97] standard. The Population and Human Health assessment will ascertain the likely positive and negative effects of the construction and operation of the Scheme, and the opportunities for improving health and reducing inequalities.

12.2 Study area

12.2.1 The study area for this assessment has been set according to:

- The extent and characteristics of the project; and
- The location (in relation to the project), characteristics and sensitivity of communities and associated facilities / amenities.

12.2.2 As per the DMRB LA 112 assessment study areas, assessment is based on the construction footprint / DCO boundary, which includes compounds and temporary land take plus 500 m area surrounding the Scheme boundary.

12.2.3 Effects within the Population and Human Health assessment are derived from changes in wider health determinants, largely selected from other technical assessments undertaken as part of the environment impact assessment (e.g. Air Quality, Noise and Vibration, Drainage and the Water Environment). Consequently, the study areas defined in each contributing technical chapter also apply.

12.2.4 Where likely effects are identified outside the 500 m area surrounding the project boundary, the study area will be extended accordingly. That will also include the findings of other EIA topics that inform the Population and Human Health assessment, such as Landscape and Visual impact, Transport, Noise and Vibration and Air Quality.

12.2.5 Baseline data collated is described below and presented on Volume 3 Figure 12.1.

12.3 Methodology

12.3.1 The assessment of effects has been undertaken in accordance with the EIA Regulations 2017, and general guidance documents including the Guidelines for Environmental Impact Assessment, published by the Institute of Environmental and Assessment.

12.3.2 The assessment uses the guidance set out in DMRB LA 112 which provides a framework for assessing, mitigating and reporting the effects of motorway and all-purpose trunk road projects on population and human health.

[97] https://www.standardsforhighways.co.uk/dmrb/search/1e13d6ac-755e-4d60-9735-f976bf64580a

12.3.3 The assessment establishes the baseline population and human health conditions within those areas likely to be affected by the Scheme. The assessment then ascertains the likely positive and negative effects of the construction and operation of the Scheme, and opportunities for improving health and reducing inequalities.

12.3.4 The significance of effects for land-use and accessibility will be determined in accordance with the criteria in DMRB LA 104. The significance of effects for human health will be determined in accordance with the criteria in DMRB LA 112.

12.4 Existing Environmental Conditions

Private property and housing

12.4.1 There are a few key settlements of note located in and around the study areas. These settlements include Hattersley, Mottram in Longendale, Hollingworth, Hadfield and Gamesley. Several residential properties and associated land are located within the DCO boundary. The location and number of properties at risk of demolition, or from which land will be required/accessed affected by the Scheme are listed in Section 2.13 of Chapter 2 The Scheme.

Community land and assets

12.4.2 The settlements of Mottram in Longdendale, Hollingworth, Hattersley, Gamesley and Hadfield include a variety of social and community infrastructure, including education and healthcare facilities, community centres, places of worship, libraries and sporting facilities. Facilities that have been identified within 500m of the Scheme are shown on Volume 3 Figure 12.1 and are reported below as Table 12-1. Cricket grounds have been identified within the DCO boundary. Community facilities within the wider study area include Arundale Primary School, Hollingworth Primary School, Mottram Evangelical Church and the Awburn House Medical Practice.

Table 12-1 - Community Receptors identified within wider study area

Receptor Type	Receptor Name
Church	• St James Church • Hattersley Baptist Church • St Barnabas • St Michael and All Angels Church • Mottram Evangelical Church • St Mary's Church Hollingworth • Hollingworth Methodist Church
Health Centre	• The Smithy Surgery • Hattersley Group Practice • Awburn House Surgery • Dr Rushton and Partner • Hollingworth Clinic
Other	• Air Cadets - 468 (Hyde) Squadron • William Ford House (sheltered housing) • Balmoral Care Home

Receptor Type	Receptor Name
	• Well Hollingworth - Market Street (pharmacy) • Hollingworth United Methodist Cemetery • Hollingworth Cricket Club • Etherow Bowling Club • Cricket Ground • Etherow Lodge Park • Melandra Crescent Play Area • Hattersely Library • Mottram Cricket Club • Melandra Roman Fort • Park/Garden off Melandra Castle Road

Development land and businesses

12.4.3 A number of commercial assets have been identified towards the east of the Scheme, including enterprises within Dinting Lodge Industrial Estate, Glossop Caravans and a BP Petrol Station. These have been summarised with other receptors identified in the wider study area, as Table 12-2 below:

Table 12-2 - Commercial Receptors identified within wider study area

Receptor Type	Receptor Name
Commercial Asset	• Tesco Extra Filling Station • Mottram Wood (Pub and Carvery) • The Original Abduls (Indian Takeaway) • Premier (convenience store) • The Great Wall Chinese Takeaway • Total Adrenaline (Amusement/Soft Play Centre) • Whitegate Kennels • Shell Filling Station • BP Filling Station • W. Brindley's Funeral Service • Mottram Post Office • MCC Studios (recording studio) • Gun Inn • Hollingworth Post Office • Hollingworth Liberal Club • Industrial area with multiple businesses • Industrial area with multiple businesses • Tesco • Mcdonalds • Premier Inn • Glossop Caravans • BP Filling Station • K Motors

Receptor Type	Receptor Name
	• Barwoods Fitted Bedroom

12.4.4 The Mottram Agricultural Showground is located within the DCO boundary to the north of the Scheme. The Mottram Show, held by the Mottram and District Agricultural Society, takes places annually every summer and attracts thousands of visitors every year for a whole range of classes for sheep, cattle, dogs and horticulture, plus other activities including horse competitions, trade stands, craft and vintage engine displays.

12.4.5 The Mottram Show has acquired a new lease for a larger showground, to which it would be relocating.

12.4.6 The emerging Greater Manchester Spatial Framework (GMSF) includes a number of draft allocations for residential and employment land uses. There have been two previous consultations on the GMSF (2016 and 2019). There will be a third draft plan produced (GMSF 2020) – The relevant Districts will be asked to formally approve the plan in October/November 2020. It is anticipated that the plan will be ready for adoption at some point in 2022.

12.4.7 These allocations include the Godley Green Garden Village (Policy GM Allocation 43) 1.5 km south east of the Scheme with the land allocated for a new settlement including 2350 new homes. Whilst the GMSF is not yet approved, it is important to recognise these draft allocations.

12.4.8 It should be noted that these allocations may be subject to change. Once the GMSF is published, it will have more detailed information on the allocations and provide information on a range of topics including population figures.

12.4.9 In terms of development land, planning permission has been granted or is pending a decision in the wider study area of the Scheme for:

- Application reference 20/00405/FUL: Roe Cross Green Café, Roe Cross Road, Mottram. Construction of 6 no. houses and associated works;
- Application reference 20/00594/FUL: Roe Cross Green Café, Roe Cross Road, Mottram. Conversion of former café/shop/garden centre into 9 no. two-bedroom apartments and associated works;
- Application reference 20/00698/CPUD: 9 Roe Cross Green, Mottram. Lawful Development Certificate for proposed development. First floor rear extension above existing single story rear extension;
- Application reference 20/00249/FUL: 19 Spout Green, Mottram. Proposed orangery to side elevation (existing conservatory to be removed);
- 20/00063/PLCOND. 14 Hall Drive, Mottram. Full discharge of condition 3 and 4 of planning permission 19/00154/FUL (Full two storey side and rear extension, single storey front, side and rear extensions and loft conversion;
- 20/00629/FUL: 8 Carrhouse Lane, Hollingworth, Tameside. Proposed extension to existing rear balcony; and

- HPK/2020/0117: Land rear of 58 to 86 Woolley Bridge, Hadfield, Glossop relating to HPK/2017/0198: Outline application with all matters reserved (except access) for residential development and associated works.

12.4.10 These applications cover the current planning history for the wider study area of the Scheme at September 2020. It is possible that other relevant planning applications may come forward during the DCO application process for the Scheme. These will be updated in the ES.

Agricultural holdings

12.4.11 The principal land use within the footprint of the Scheme is agriculture. The land is predominantly under pasture for cattle and sheep, with some grass cut for feed in the eastern part of the Scheme. Small areas of woodland are present, often as linear features along field boundaries.

12.4.12 Farm sizes, measured on Google Earth are less than 80 ha, but it is possible the affected holdings rent or own additional land outside the study area.

12.4.13 Agricultural businesses and other land holdings that would be potentially affected by land-take and severance are listed below and shown on Volume 3 Figure 12.1.

- Grange Farm – North of the A57 between the M67 Junction 4 and A6018;
- Nettle Hall Farm – At the north east of the Scheme on Coach Road;
- Mottram Moor Farm – Immediately south of the A57, beside Carrhouse Lane;
- Robin Hood Farm – South of the Scheme beside Carrhouse Lane;
- Tara Brook Farm – South of the A57 at the eastern end of the Scheme; and
- Home Farm – At Woolley Bridge, east of the River Etherow.

12.4.14 These types of livestock farms are assessed as receptors of medium sensitivity on the basis of DMRB LA112:

- Areas of land in which the enterprise is partially dependent on the spatial relationship of land to key agricultural infrastructure; and
- Access between land and key agricultural infrastructure is required on a reasonably frequent basis (monthly).

Walkers, Cyclists and Horse-riders (WCH)

12.4.15 The following WCH information is derived from ‘rowmaps’ an online information source that uses Ordnance Survey mapping to display PRoW mapping. The Atkins WebGIS tool has also been used to inform the understanding of baseline conditions.

12.4.16 PRoW and other recreational routes including bridleways and cycle routes are present within the wider study area, including the Pennine Bridleway National Trail (which incorporates the Trans-Pennine National Cycle Route 62 along part of its route). All PRoW are shown within Volume 3 Figure 12.1.

12.4.17 The Pennine Bridleway National Trail is used by horse riders, cyclists and walkers and has two alternative sections of route in the vicinity of the Scheme, described below:

- Section (a) incorporates the Etherow – Goyt Valley Way and Tameside Trail and passes between Broadbottom and Hollingworth. The route section crosses the A57(T) to A57 Link Road approximately 700m to the south of the A57 Mottram Moor to meet Woolley Lane to the east of Hollingworth.
- Section (b) incorporates the Trans-Pennine Trail National Cycle Route 62 and passes between Gamesley and the west side of Hadfield. The route section crosses the A57 at a point inside the DCO boundary. The crossing point corresponds with the junction of the A57 Link Road and existing A57 at Woolley Moor.

12.4.18 Other PRoW potentially affected by the Scheme, either in terms of severance or amenity of users, include:

- PRoW LON/52/30 & LON/52/20 & LON/52/10 - runs from the A57 Hyde Road near the M67 Junction 4, in a north east direction towards Old Mill Farm to the west of Mottram in Longdendale;
- PRoW LON/50/10 & LON/50/20 – runs from the A57 Hyde Road near the M67 Junction 4, in a north west direction towards Edge Lane;
- PRoW LON/51/20 & LON/51/10 – runs from the A57 Hyde Road in a north west direction towards Edge Lane in the north;
- PRoW LON/88/60 – runs in a north south direction from the A57 Mottram Moor through Robin Hood Farm and links with the wider footpath network;
- PRoW LON/90/10 – runs in a south west direction from Woolley Lane through Tara Brook Farm and links with the footpath wider network;
- PRoW LON/87/10 – towards the south of the Scheme, the PRoW runs in a north east/south west direction from the A57 Mottram Moor and links with PRoW LON/86/10 and runs in a westerly direction towards Market Street;
- PRoW LON/35/10 – runs in a north-south direction along Old Hall Lane; and
- Bridleway LON/108/10 runs approximately 150 m to the north of the Scheme, along Coach Road in a north-west/south-east direction from Mottram Old Hall towards the A57 Mottram Moor.

Human Health

12.4.19 The definition of baseline conditions follows published guidance provided in DMRB LA112 to inform the assessment of the sensitivity of health determinants and receptors in the study area, particularly the presence of any vulnerable groups, which may be more susceptible to impacts.

12.4.20 The human health baseline focuses on the human health profile for the wider study area, including demographic profile, demographic trends, socio-economics, deprivation, health and wellbeing characteristics, and general characteristics of the natural and built environment.

12.4.21 There are two Local Authorities of relevance to the Scheme – Tameside MBC and High Peak Borough Council. This section provides an outline of the current health status of residents who are living in the wider Tameside and High Peak areas.

Tameside

12.4.22 According to Tameside MBC's Join Strategic Needs Assessment (2018/2019), the Tameside population is approximately 224,119.

12.4.23 The main health and well-being challenges for Tameside include:

- Higher demand for health and social care services across the area as the population continues to grow, age and change;
- Changes in the age profile of the population are currently contributing to the increased demand on health and social care services; and
- The health of people in Tameside is generally worse than the England average. Tameside is one of the 20% most deprived districts/unitary authorities in England and about 20% (8800) children live in low-income families.

12.4.24 Data from the 2011 Census highlighted that 44% of residents report their health status as 'very good', which is slightly lower than that for the north west as a whole. The proportion of residents who report their health status as 'bad' and 'very bad' within Tameside was 6% and 2% respectively, (which is comparable the north west as a whole).

12.4.25 The proportion of residents in Tameside with an activity limiting health problem or disability who consider their day-to-day activities to be 'limited a little' is 10%, which is the same for the north west as a whole. Those that consider their activities to be 'limited a lot' is slightly higher at 11% of residents in Tameside, which is slightly higher than for the north west as a whole.

12.4.26 Public Health England produce an annual Health Profile for each local authority area. The profile for Tameside prepared in 2019 shows that life expectancy at birth for women within Tameside is 80.7, 2.5 years lower than the England average of 83.2. Male life expectancy is 77.6, 3.1 years lower than for females and 2 years lower than the England average of 79.6.

12.4.27 Data on under 75 mortality rates (all causes) for both males and females, shows that within Tameside this is significantly worse than the England average. The suicide rate in Tameside is not significantly different than the England average.

12.4.28 When looking at levels of obesity, childhood obesity levels (based on children in Year 6 of primary school) for Tameside is not significantly different from the England average. However, when looking at adult rates of excess weight for Tameside, this is significantly worse than the England average.

12.4.29 Deprivation can be measured across seven different domains – income, employment, health, education, living environment, crime and barriers to services, using a wide range of indicators. These measures are aggregated to create an Index of Multiple Deprivation (IMD), which gives an indication of overall deprivation and ranks every small area in England (known as Lower Super Output Areas or LSOAs, based on the 2011 Census.

12.4.30 Analysis has shown that 35% of LSOAs in Tameside are within 20% most deprived in England. Further scrutiny of the data shows that there is a concentration of deprivation in the west of Tameside. For example, one LSOA which is found towards the west of Tameside, is ranked at 0.9% most deprived LSOA in England. In addition,

there are significant levels of deprivation which are found within the study area, for example one LSOA towards the west of the Scheme is in the 5% most deprived LSOA in England.

12.4.31 Health deprivation is one specific domain that makes up the IMD. Analysis of this domain has shown that there is a disproportionate concentration of LSOAs found in the west of Tameside which score poorly on this domain. However again, there are significant pockets of health deprivation which are found in the immediate vicinity of the Scheme.

12.4.32 It should be noted that this an indicative summary of the LSOA. Updated information on LSOA will be provided within the ES.

High Peak

12.4.33 According to Derbyshire County Council's Join Strategic Needs Assessment, the main health and wellbeing challenges for High Peak include:

- The wider population of Derbyshire is currently proportionately older than England overall, with around one in five people aged 65 and over;
- Almost a further fifth are aged under 16, meaning two out of every five people are dependent on the working age population;
- By 2039 almost half the population will be in these age groups, nearly three in every ten people will be aged 65 and over.

12.4.34 Data from the 2011 Census highlights that 48% of residents within High Peak report their health status as 'very good', which is higher than for the East Midlands as a whole (45%). The proportion of residents who report their health status as 'bad' and 'very bad' within High Peak are 4% and 1% respectively (which is the same as reported for the East Midlands as a whole).

12.4.35 The proportion of residents in High Peak with an activity limited health problem or disability, who consider their day-to-day activities to be 'limited a little' is 10%, which is the same as that for the north west as a whole. Those that consider their activities to be 'limited a lot' is slightly lower at 8%, which is lower than for the north west as a whole (10%).

12.4.36 In relation to Public Health England's profile for High Peak, the profile High Peak for 2019, shows that life expectancy at birth for women within High Peak is 83.4, which is not significantly different from the England average of 83.2. Male life expectancy is 79.9, 0.3 years higher than the England average.

12.4.37 Data on under 75 mortality rates, shows that within High Peak, this is not significantly different from the England average. When looking at levels of obesity, childhood obesity levels (based on children in Year 6 of primary school) for High Peak, this is significantly better than the England average. In addition, when looking at adult rates of excess weight, this is not significantly different than the England average.

12.4.38 Looking at IMD, analysis has shown that 5% of LSOA in High Peak are within the 20% most deprived in England. Further scrutiny of the data shows that there is a concentration of deprivation in the west of High Peak, particularly towards the south west. For example, one LSOA which is found towards this area, is ranked as the 3.5%

most deprived LSOA in England. However, there are area which exhibit much lower levels of deprivation. For example, one LSOA is in the bottom 35% most deprived in England.

12.4.39 In relation to the health domain, analysis has shown that there is a disproportionate concentration of LSOAs found in the south west of High Peak, which score poorly on this domain. However, as with the overall IMD, the health domain score much more positively within the study area.

12.4.40 It should be noted that this an indicative summary of the LSOA. Updated information on LSOA will be provided within the ES.

Future baseline

12.4.41 The future baseline has been determined using various data sources, including borough level population and employment growth projections. Data has been collected from the Office for National Statistics, which outlines projected population growth between 2018 and 2043 (shown in Table 12-3).

12.4.42 Analysis has shown that High Peak is expected to experience population growth of 8.0% between 2018 and 2043 and Tameside 9.5% over the same period. High Peak will experience a similar growth as the North West but lower than England. Tameside will experience a higher growth than the North West and England as a whole, 8.1% and 9.3% respectively.

Table 12-3 - Forecast Population Growth within the Wider Study Area

	2018	2043	% growth
High Peak	92,221	99,610	8.0%
Tameside	225,197	246,671	9.5%
North West	7,292,093	7,881,552	8.1%
England	55,977,178	61,744,098	9.3%

Source ONS, Subnational population projections for England: 2018-based

12.4.43 The emerging GMSF (2019)[98] highlights how Greater Manchester will experience sustained growth in jobs, the economy and the population, including:

- An increase of around 110,000 jobs by 2037 although a more ambitious accelerated growth scenario estimates an increase of about 180,000 jobs;
- An increase in population by around quarter million people by 2037, and this in turn will contribute to a significant increase in households.

[98] https://www.greatermanchester-ca.gov.uk/what-we-do/housing/gmsf2020/

- The document highlights that a high level of economic growth is being planned for Greater Manchester, well above baseline forecasts, taking advantage of the proposed transport investments and potential development opportunities. A variety of high quality sites will be made available across the sub-region. Amongst a number of key objectives of the emerging GMSF (2020), improvements to transport infrastructure is key, with the document stating *'Despite the emphasis on walking, cycling and public transport, there will still be a need for targeted improvements to the highway network so that people and goods and move around the city region efficiently. This will be important for supporting economic growth, both in Greater Manchester and the wider North of England, helping to better connect places and tackle congestion'.* This Scheme will make a significant contribution to delivering on this aim.

12.4.44 TMBC is preparing a new Local Plan. The Local Plan will replace the currently adopted Unitary Development Plan adopted in 2004 and will incorporate the strategic policies and allocations as they evolve in the draft GMSF.

12.4.45 The Growth Strategy for High Peak (High Peak Borough Council, 2017) sets out a plan for sustainable growth and identifies development opportunities in the Borough for the next 15 years. A key cornerstone of this strategy is to reinforce the distinctive High Peak identity by sustained and planned growth in jobs, housing, footfall, tourism and spend in the economy, making High Peak a better place in which to work, live, play and travel.

Local Economy

12.4.46 This section presents the wider context within which the Scheme is located, using the local authority areas of High Peak Borough Council and Tameside MBC to present relevant socio-economic data.

12.4.47 According to the Office of National Statistics[99] annual population survey between April 2019 and March 2020, the unemployment rate was higher in Tameside (4.5%) than North West as a whole (4%). The unemployment rate in High Peak between April 2019 and March 2020 was 3.3%, which is lower than the East Midlands as a whole (3.7%).

12.4.48 Labour market data for each of the two local authority areas is summarised below.

12.4.49 Tameside – the Office for National Statistics annual population survey shows that between April 2019 and March 2020, the economic activity rate in Tameside was 78.4%, higher than the north-west region as a whole (78.1%). The main source of employment is the wholesale and retail trade; repair of motor vehicles and motorcycles, in addition to manufacturing and human health and social work activities.

12.4.50 High Peak – for the same period, the economic activity rate for the High Peak area was 71.8%, lower than the East Midlands region as a whole (79.7%). The main sources of employment include the manufacturing, wholesale and retail sectors.

[99] https://www.nomisweb.co.uk/reports/lmp/la/1946157138/report.aspx

12.5 Other baseline information to be obtained/surveys to be undertaken

12.5.1 Other baseline information to be obtained primarily relates to traffic data and non-motorised user counts.

12.5.2 Surveys to ascertain usage of PRoW and bridleways will be undertaken to inform the ES. Methodologies for undertaking surveys will be subject to agreement with relevant local authorities, e.g. CCTV surveys.

12.5.3 Land owner/land manager interviews would be undertaken to understand the nature of the farm/forestry businesses such that an assessment of the impacts on farm viability can be undertaken. As none of the land affected by the Scheme is classified as best and most versatile, no ALC surveys are required.

12.5.4 Impacts of the Scheme on individual holdings will be assessed in detail through farm interviews. These will provide information of land use, movements of livestock and farm vehicles and the location of essential farm infrastructure such as field drains and water supplies.

12.6 Potential Effects and Mitigation Measures

12.6.1 The potential effects of the Scheme during construction and operation and the measures proposed to manage them are outlined below.

12.6.2 Assessment of potential effects is currently underway and the following section provides an indicative summary of likely effects. Further detailed assessment will be provided within the ES.

Population

Effects on private property and housing

12.6.3 Permanent land acquisition required as part of this scheme and the demolition of a number of buildings (listed in Section 2.13) would likely lead to significant effects.

12.6.4 There may be indirect impacts on private assets in the wider study area as a result of changes in amenity for people who live and work in the vicinity of the Scheme. In addition, there would be direct impacts from temporary diversion routes and road closures. Such impacts could arise from a combination of construction activities (dust, construction traffic, visual impacts and noise levels (refer to Chapters 5 Air Quality, Chapter 7 Landscape and visual effects and Chapter 11 Noise and vibration).

12.6.5 The Scheme would improve access for residents in the study area as a result of reduced congestion on the local highway network.

Effects on community land and assets

12.6.6 There are a number of community facilities found within the wider study area that would be anticipated to be subject to indirect effects. Those within the DCO boundary may be subject to significant effects, this includes The Old Hall Showground, a community facility which is home to the Mottram Show, Cricket grounds immediately to the rear of properties in Four Lanes off Stalybridge Road.

12.6.7 The Mottram Show has acquired a new larger showground, to which it will be relocating. Whilst further discussions would be required with the organisers of the show, the new location is unlikely to be affected by the Scheme as it is outside of the DCO boundary. However, this would be subject to confirmation.

Effects on development land and businesses

12.6.8 The emerging GMSF (2019)[100] includes draft allocations for residential land uses, including land to the south of the A57.

12.6.9 The allocations found to the south of the Scheme would not be directly impacted in terms of loss of developable area; the Scheme could create improved linkages and access that may benefit the end use of the land. With mitigation there would be a beneficial (permanent) effect, which would be considered significant.

12.6.10 However as noted above, there will be a third draft plan produced (GMSF 2020) – The relevant Districts will be asked to formally approve the plan in October/November 2020. It is anticipated that the plan will be ready for adoption at some point in 2022.

Agricultural holdings

12.6.11 In the construction phase approximately 50 ha of agricultural land would be permanently acquired and 15 ha would be occupied temporarily.

12.6.12 Land temporarily acquired would be restored to its original quality and returned to the landowner.

12.6.13 Permanent land acquisition would decrease the size of the affected holdings and may result in significant effects.

12.6.14 All affected holdings would be divided by the new road, which would mean longer journey times for vehicles and livestock having to be transported to severed fields.

12.6.15 The combination of land-take and severance on individual holdings is anticipated to result in significant effects.

12.6.16 Lesser construction impacts relate to damage to field drains and water supplies and noise and dust.

WCH

12.6.17 There would be disruption to existing PRoW as a result of construction activities, particularly given the proximity of footpaths to the Scheme.

12.6.18 The Pennine Bridleway National Trail (Section incorporating the Etherow-Goyt Valley Way and Tameside Trail) crosses the Scheme at a point inside the DCO boundary in the vicinity of Tara Brook Farm, where the temporary use of land is proposed as a site compound/material storage area. Users of the route may experience some temporary disruption as a result of the Scheme. Effects may include reductions in visual amenity and instances where a temporary diversion may be required as a result of construction activities nearby.

12.6.19 The section of the Pennine Bridleway National Trail, which incorporates the Trans-Pennine Trail National Cycle Route 62, crosses the DCO boundary in the vicinity of

[100] https://www.greatermanchester-ca.gov.uk/what-we-do/housing/gmsf2020/

Melandra Road. Again, users of the route here may experience some temporary disruption as a result of the Scheme, including reductions in visual amenity.

12.6.20 There would be a negative effect on certain PRoWs and bridleways in the vicinity of the Scheme as a result of construction activities. Effects may include PRoWs and bridleways being temporarily closed for short periods of time, or the need for temporary diversions to be put in place.

12.6.21 There would be both positive and negative effects on certain PRoWs and bridleways in the vicinity of the Scheme during operation. Positive effects may include the creation of new, accessible footpath links across the road; negative effects may include lengthier journey times as a result of diversion routes created.

Human health

Accessibility

12.6.22 Temporary disruption to traffic flow during construction, may affect access to work and training. Construction activity is likely to result in delays, increased fear of potential accidents, and route uncertainty associated with traffic management, lane restrictions and diversions.

12.6.23 Temporary disruption to traffic flow during construction may affect accessibility to community facilities and receptors which are inclusive to wider and vulnerable groups.

12.6.24 The improvement works by the Scheme would alleviate congestion and could provide improved access to community facilities due to decreased journey times and increased route amenity.

12.6.25 The widened operational A57 would result in improved access. Access to the GMSF housing allocations to the south of the A57 would be improved through the implementation of the dual carriageway.

Landscape Amenity

12.6.26 Potential increases in journey times to open spaces outside the study area has the potential to affect the extent to which people access open spaces.

12.6.27 The improvement works could provide improved access to open spaces outside the study area due to decreased journey times, greater connectivity to the strategic highway network and increased route amenity such as new woodland block planting to integrate within wider landscape, and infill of existing hedgerows within the wider character area.

Air pollution

12.6.28 There is the potential for temporary elevated dust deposition and soiling at properties within proximity to the indicative construction site boundary as consequence of the works. The level and distribution of dust emissions would vary according to the duration and location of activity, weather conditions, and the effectiveness of suppression measures.

12.6.29 An increase in vehicle movements is expected to occur during the construction period, associated with the transport of materials, plant and labour to and from site.

12.6.30 Sensitive human health receptors for the purpose of air quality assessment have been defined in DMRB LA 105 and include residential properties, locations of susceptible populations e.g. schools, hospitals and care homes for the elderly, or any other location where a member of the public may be exposed to an air pollutant for the relevant regulated time period. Full details on the Annual mean NO_2 results at receptors which are exceeding the annual mean NO_2 AQS objective can be found in the Air Quality chapter (Chapter 5).

12.6.31 There are expected to be exceedances of the annual mean NO_2 AQS objective in the opening year 2025 without the Scheme at 83 human health receptors. The exceedances are located adjacent to the A57 through Mottram, at the Woolley Lane/A57/A628 junction (Woolley Lane Junction), adjacent to the A628 north of the

Woolley Lane junction and at the Dinting Vale Junction. Of the 83 receptors exceeding in the DM, 82 receptors have a decrease in annual mean NO_2 concentrations with the Scheme in place, and one receptor has an imperceptible change. The receptors with a decrease in annual mean concentrations are located adjacent to the A57 in Mottram, at the Woolley Lane Junction and at the Dinting Vale Junction. The decreases in concentrations can in some cases result in concentrations reducing to below the annual mean NO_2 AQS objective, but other cases the concentrations reduce but are still above the annual mean NO2 AQS objective.

12.6.32 With the Scheme in the opening year 2025 there are expected to still be exceedances of the annual mean NO_2 AQS objective at 33 receptors. These receptors are located adjacent to the A57 in Mottram, at the Woolley Lane Junction, adjacent to the A628 and at Dinting Vale Junction. Of the 33 receptors that still exceed in the with the scheme, 32 are expected to have a decrease i.e. an improvement in air quality. There is one receptor expected to exceed the annual mean NO_2 AQS objective with the Scheme and to not have a decrease in annual mean concentrations. This receptor is adjacent to the A628 north of the Woolley Lane Junction and is expected to have an “imperceptible” change.

Noise pollution and vibration

12.6.33 It should be noted that the detailed noise assessment will be provided in the ES. There is potential for short term adverse noise and vibration effects during the Scheme construction phase. It is anticipated that construction noise effects could occur due to the following aspects:

- Noise from the operation of construction plant;
- Noise from the construction of the Mottram Underpass; and
- Noise from HGV movements to and from the site, for example site deliveries and the removal of spoil.

12.6.34 It is anticipated that construction vibration effects could occur due to the following construction activities –

- Percussive piling activities; and
- Vibratory piling activities.

12.6.35 Rotary bored piling operations are considered to have inherently low vibration levels, even at close proximity, and it is unlikely that any adverse effects from this type of piling activity would occur.

12.6.36 As part of a DMRB LA111 operational assessment it is necessary to consider road traffic noise changes resulting from the Scheme in both the short and long term. At this stage, changes are considered between the ‘Do Minimum Opening Year’ scenario of no Scheme, and the opening year of the Scheme (Do Something Opening Year) and 15 years hence (Do Something Future Year). The full scope of the assessment will be presented in the ES.

Soil and water pollution

12.6.37 Potential for localised contamination can occur during the construction period from construction spills and road run-off.

12.6.38 There is a potential for localised contamination during operation from road run-off containing particles from car tyres, brake linings and road surfaces as well as chemicals such as fuel, oils, additives and braking fluid. Traffic accidents also have the potential to result in pollution incidents.

12.6.39 Soil and water pollution could lead to public health impacts directly should people in the core study area encounter polluted water and soil through recreation activities and/or indirectly through the use of water for garden and allotment watering. A reduction in pollutants released to soil and water can lead to positive effects on public health.

Risk of injury and death

12.6.40 Vulnerable road users, including motorcyclists, elderly drivers, children, pedestrians, new drivers and cyclists, may be more at risk of injury due to increased construction traffic and altered road layout. However, slower vehicle movements during the construction period, may mitigate potential adverse impacts.

12.6.41 Alterations to existing traffic routes and patterns could increase the risk of injury though increased traffic levels and an unawareness of altered road layout.

12.6.42 During operation, clear lighting and signage provision, as well as appropriate pedestrian crossing facilities, should reduce fear of accident and the extent to which accidents occur. However free flow traffic, increased traffic numbers and higher vehicle speeds may have adverse effects on the risk of injury and death.

Mitigation Measures

12.6.43 There are opportunities to introduce mitigation and enhancement measures into the Scheme design, and the management of construction of the Scheme. The design would be developed with the impacts on population and human health, sensitive receptors and future development requirements in mind. Reduction in compulsory purchase of property, land and assets, worsening severance and avoiding reducing walkers, cyclists and horse-riders provision or increasing journey times would be key considerations. The use of best practice construction methods would reduce disruption to users of sensitive receptors near the Scheme and minimise the effects on the community, especially those susceptible or vulnerable to health issues.

12.6.44 It is anticipated the following general measures would be embedded into the Scheme:

- The extent of direct, permanent land take affecting identified individual receptors would be minimised;
- Route design would be such to minimise / reduce severance
- Users of affected PRoW, footpaths and cycleways would be notified of planned diversions and closures, with signs along sections to be closed during construction, at least one month prior to the works;

- Construction works would be programmed so that affected PRoW, footpaths or cycleways remain open for part, or the duration, of the construction period, and also that other routes can act as a diversion route for those affected;
- Clear signage and provision of access information for all users during construction and before operation would be provided;
- All the environmental design mitigation from the other topics, notably Landscape, Air Quality and Noise and Vibration which are linked to this topic would be implemented;
- Public transport routes and stops would be maintained/disruption managed; and.
- Where it is not possible to avoid or reduce significant adverse effect, e.g. to loss of community facilities such as sports pitches, equivalent facilities would be provided as close to the original location as possible

12.6.45 It is assumed that the following general measures would be embedded into the operational phase of the Scheme:

- Clear signage and provision of access information for all users before and during operation;
- The production of a communication plan which would help inform the local community (particularly residents, employees, road users and NMU) of the improvements to accessibility, connectivity and journey times delivered; and
- Ensure pedestrian linkages and accessibility are maintained.

12.6.46 Mitigation measures that would target effects resulting from impacts affecting specific aspects of this topic assessment are set out in the following section.

Private property and housing

12.6.47 For properties that would be subject to demolition, mitigation would include adhering to the methods and procedures for assessing appropriate levels of compensation (in accordance with the National Compensation Code). Where appropriate, consultation with landowners, occupiers and agents would continue as the Scheme develops, to manage and reduce impact on property owners as far as practicably possible.

12.6.48 The Scheme has been designed with minimal land-take in mind. Phasing of land-take for construction works can also be planned to enable early release of land and thereby minimise the extent of disruption.

Community assets

12.6.49 Construction works have the potential to affect access to and from community facilities. This may be mitigated through the use of effective temporary traffic management.

12.6.50 Where there are increase traffic flows in proximity to schools and other community facilities, design should seek to minimise the effect of extra traffic on amenity and severance.

12.6.51 Highways England has been working closing with representatives of the Mottram and District Agricultural Society and the Mottram Show would be in its new location (outside the DCO boundary).

Development land and businesses

12.6.52 Highways England would work closely with managers / owners of local visitor attractions to ensure they are fully informed of work programmes and schedules. This would give such attractions an opportunity to plan events around works and communicate with customers. This would minimise potential disruption and any impacts on business operations and viability.

12.6.53 The effects of disruption to businesses found in proximity to the Scheme would be minimised or avoided through measures in the Traffic Management Plan. These could include restrictions on routes taken by construction traffic and careful design/timing of temporary road closures or diversions.

12.6.54 Impacts on development land would be mitigated by working closely with the stakeholders involved in the development of the GMSF to determine if the draft plan is adopted and to ensure they are fully aware of infrastructure proposals and timings as they proceed.

12.6.55 In addition, any temporary adverse impacts on development land would be mitigated, where possible, by adhering to the Traffic Management Plan and following standardised construction procedures set out in the EMP in accordance with DMRB LA 120.

Agricultural holdings

12.6.56 Land temporarily acquired for construction would be restored to a condition equivalent to its original. This would be achieved by means of a Soil Handling and Management Plan following the best practice set out in Defra's *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites*[101].

12.6.57 There is no mitigation for permanent loss of agricultural land, apart from financial compensation which is outside the scope of an environmental assessment.

12.6.58 Underpasses are built into the Scheme and so no agricultural land would be rendered inaccessible. The only mitigation for extra journey times and the inconvenience caused by severance is financial compensation which is outside the scope of an environmental assessment.

12.6.59 Field drains and field water supplies would be diverted or replaced.

12.6.60 Appropriate noise and dust mitigation would be implemented during construction,

12.6.61 Livestock fencing would be installed around construction sites and beside the new road on its completion.

12.6.62 An agricultural liaison officer would be available to deal with issues affecting the operation of agricultural holdings during construction.

[101] Department for Environment, Food and Rural Affairs (2009), *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites*. https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites Viewed August 2020

Walkers, Cyclists and Horse-riders (WCH)

12.6.63 The implementation of a communication plan for pedestrian routes would inform WCH of route closures and alterations.

12.6.64 Where works are to take place in the vicinity of footpath/cycleways and PRoWs, measures should be put in place to safely divert users around worksites and ensure safe passage.

12.6.65 Where the Scheme results in stopping up of existing PRoWs, it is recommended that appropriate signage should be provided to direct pedestrians, cyclists and horse riders to the safest alternative route.

12.6.66 Early engagement is to be made with members of the public and relevant stakeholders in order to ensure they are fully informed of any potential closures and diversions as far as in advance as possible.

12.6.67 Siting of compound buildings and material storage areas away from PRoWs and National Trails.

12.6.68 Landscaping including tree, shrub and hedgerow planting and bunding to reduce perception of noise and visibility of Scheme – planting is to occur as early as possible in the construction programme to allow for its establishment as soon as possible.

12.6.69 Liaise directly with PRoW and National Trail officers in order to keep them fully appraised of works and of any diversions/closures planned.

Human Health

12.6.70 Design to consider sensitive communities and avoid where possible compounding existing health issues in sensitive communities

12.6.71 Design to minimise severance or isolating communities from facilities or services by maintaining or providing connectivity over / under the route option and provide mitigation to minimise health effects

12.6.72 Appropriate signage and traffic management should be used to guide road users to altered access to work and training during the construction phase.

12.6.73 Access to green space and recreational areas / facilities should be maintained wherever practical during the construction phase, with appropriate signage to direct road users and pedestrians to temporarily realigned routes.

12.6.74 Restrictions to working hours would limit the amenity impact on users of green space.

12.6.75 Appropriate temporary traffic management and signage would reduce the potential for injury and death during the construction phase.

12.6.76 During the operational phase, clear lighting and signage provision, as well as appropriate pedestrian crossing facilities, should reduce fear of accident and the extent to which accidents occur.

12.6.77 Air pollution impacts on human health would be mitigated through restrictions to working hours coupled with general construction controls.

12.6.78 Noise impacts would be mitigated through restrictions to working hours in line with general construction controls.

12.6.79 Soil and water impacts would be mitigated through standard best practice, appropriate working practices and PPE, contaminated land risk assessment and remediation measures as appropriate for end use.

12.7 Summary

12.7.1 The chapter provides the preliminary information identifying the likely effects on population and human health. Whilst it will be possible to identify changes to some of the determinants of health likely to arise from the Scheme, health outcomes are dependent on multiple factors, some of which rest with individuals and/or outside the powers or influence of physical infrastructure and/or planning decisions. Identifying health effects of the Scheme and their significance will therefore be a qualitative exercise. The findings are based upon a desk-based study of the area, along with consultants' professional judgement and knowledge based on previous similar schemes. Information, where relevant, is also used from other specialist topic assessments to help to assess the significance of effects of the Scheme on receptors.

12.7.2 The human health section of this chapter is by nature an initial cumulative assessment which considers the population and human health impacts of all environmental effects of the Scheme. Therefore, there will be a degree of overlap between this chapter and the other technical chapters ((notably, air quality, noise and vibration, road drainage and the water environment, landscape and visual effects.

13 Road drainage and the water environment

13.1 Introduction

13.1.1 This chapter sets out the assessment methodology to be used when identifying and assessing any significant effects that the Scheme may have on the road drainage and water environment, and the need for any mitigation to manage such effects.

13.1.2 The scope of the chapter will comprise impacts to surface water features and flood risk predominantly associated with the creation of surface-borne pollutants, works within surface water features, surface water runoff and works within areas identified to be at risk of flooding

13.2 Study area

13.2.1 The study area for the assessment of impacts to road drainage and the water environment extends to 1 km from the Development Consent Order (DCO) boundary of the Scheme. This distance was selected through professional judgement and understanding of the local watercourse connectivity which considers 1 km to be an appropriate distance for any potential impacts to be sufficiently dampened (for example, dilution of pollutants).

13.3 Methodology

13.3.1 The methodology and assessment criteria presented in Design Manual for Roads and Bridges (DMRB) LA113 Road drainage and water environment[102] will be applied to assign both the importance of the receptors and the impact of the Scheme. The significance of the potential impact shall be determined in accordance with DMRB LA104[103] Environmental Assessment and Monitoring.

13.3.2 Methodologies for the Flood Risk Assessment (FRA) and Water Framework Directive (WFD) assessments are set in Sections 13.5.2 and 13.5.5 respectively.

13.3.3 The Highways England Water Risk Assessment Tool (HEWRAT), will be used to assess the effects of road drainage discharges, and the risks from spillages, on the quality of receiving water bodies and will inform the ES. The HEWRAT assessment will be provided as an appendix to the ES.

13.3.4 A FRA will be undertaken in accordance with the National Planning Policy Framework (NPPF) and local planning policy and will inform the ES chapter. More information on the FRA is outlined in Section 13.5.2.

13.3.5 A separate WFD compliance assessment will be undertaken to support the ES, the methodology for which is outlined in Section 13.5.5 in this chapter. The WFD compliance assessment evaluates the impact of likely significant effects of the Scheme on surface water and groundwater bodies, and also considers opportunities for betterment to help meet the objectives of the WFD (to protect the water environment) where appropriate.

13.3.6 Impacts to groundwater resources and groundwater quality associated with the Scheme will be addressed in the Geology and soils chapter (Chapter 9) However, to

[102] https://www.standardsforhighways.co.uk/dmrb/search/d6388f5f-2694-4986-ac46-b17b62c21727
[103] https://www.standardsforhighways.co.uk/dmrb/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a

assure the WFD assessment is in line with regulation impacts to WFD, groundwater bodies will be assessed as part of the WFD compliance assessment.

13.4 Existing Environmental Conditions

13.4.1 Baseline water environment data has been collated for the study area, as outlined below.

Water Environment Features

13.4.2 Surface water within the study area falls within the North West River Basin District (RBD), as set out in the North West River Basin Management Plan (RBMP).

13.4.3 Surface watercourses which fall within the study area are classified as either Main Rivers or Ordinary Watercourses. Ordinary Watercourses are defined as “every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows and which does not form part of a Main River”. Main Rivers fall under the legal powers of the Environment Agency (EA), whereas Ordinary Watercourses are the responsibility of Internal Drainage Boards (IDBs) or the Lead Local Flood Authorities (LLFAs).

13.4.4 A number of Ordinary Watercourses have been identified within the study area and two Main Rivers have been identified as being crossed by the Scheme.

13.4.5 The following surface water features have been identified as falling within the study area (refer to Volume 3 Figure 13.1):

- River Etherow – an EA Main River that is monitored under the WFD (Etherow (Woodhead Res. to Glossop Bk.) - GB112069060780 and Etherow (Glossop Bk. To Goyt) - GB112069061050). Approximately 315 m of the River Etherow is situated within the DCO boundary flowing north to south along the eastern edge of the Scheme. The watercourse walkover survey undertaken in March 2020 identified the River Etherow as approximately 10 m wide within the study area. Upstream of the existing A57 crossing, the watercourse is heavily modified with artificial banks, acting as flood defences, limiting marginal vegetation growth and is laterally confined by buildings within the riparian zone. Downstream of the A57, the River Etherow flows into a more open agricultural setting but, like the upstream section, is still confined by flood defences in the form of high ground, walls and embankments. The EA Flood Map for Planning (EA, 2018a)) indicates that areas local to the Scheme crossing are at high to medium risk of flooding (Flood Zones 2 and 3) should the River Etherow overflow its banks and flood defences.
- Glossop Brook – an EA Main River that is monitored under the WFD (Glossop Brook (Long Clough Brook to Etherow) - GB112069060720). The EA Flood Map for Planning indicates that there are narrow extents of land adjacent to the watercourse channel that are at medium to high risk of flooding. This watercourse falls outside of the DCO boundary.

- Hurstclough Brook – an Ordinary Watercourse from its source to the A57 where it is designated as Main River to its confluence with the River Etherow, but that is not monitored under the WFD. Within the study area Hurstclough Brook flows through agricultural pasture, with riparian vegetation comprising of terrestrial grasses and rushes. The channel has a small wetted width (typically < 1 m) and is comprised of predominantly fine substrates (sand). The EA Flood Map for Planning indicates that flood risk from this source is low. However, high groundwater levels (at or close to the ground surface) and spring flows in the upper catchment can cause localised waterlogging / flooding.
- Field drains – Ordinary Watercourses that are not monitored under the WFD. These features generally flow south eastwards towards the River Etherow. High groundwater throughout this part of the study area supports these features which are prone to causing waterlogged conditions, particularly following heavy rainfall during winter months.
- Lakes and Ponds - Lakes are defined as man-made or natural standing water bodies greater than 2 ha (20,000 m^2) with Ponds being defined as man-made or natural standing water bodies less than 2 ha (20,000 m^2) (Williams et al, 1999). There are no WFD assessed lakes within the 1 km study area, however there are a total of 22 ponds which will be assessed as part of Chapter 7: Biodiversity and where relevant, cross references will be made.

13.4.6 The study area is underlain by a single bedrock aquifer: Manchester and East Cheshire Carboniferous, classified as a Secondary A aquifer; with potential to support water supplies at a local scale (British Geological Society, 2020). There are a mix of superficial deposits present in the study area classified as secondary B; generally the water-bearing parts of the former non-aquifers, and Secondary Undefined aquifer; has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type (British Geological Society, 2020).

Designations

13.4.7 There is one Local Nature Reserve (LNR) within the study area: Hurst Clough LNR located to the south of the M67 junction 4, along Hurstclough Brook. There are no other European or National designated sites including Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Special Protected Areas (SPA), RAMSAR or National Nature Reserves (NNR) within the 1 km study area.

13.4.8 There are no Groundwater Source Protection Zones (SPZ) located within the study area.

13.4.9 There is one large surface water abstraction within the study area, drawn from Hollingworth Brook, a tributary of the River Etherow, which is fed by the Arnfield Reservoir. The abstraction is managed by United Utilities and is used for potable, public water supply. The abstraction is located approximately 500 m to the northeast (upstream) of the Scheme and is therefore unlikely to be directly affected (EA, 2017b).

13.5 Other baseline information to be obtained/surveys to be undertaken

13.5.1 To inform the next stages of our assessment the following surveys and quantitative analyses are proposed:

- Scour assessment of the proposed River Etherow crossing, to determine requirements for scour protection, as required. LLFAs and the EA would be consulted to agree surface water drainage concepts.
- A quantitative appraisal of the effects of road drainage discharges, and the risks from spillages, on the quality of receiving water bodies will be carried out using the HEWRAT, the results of which will be used to inform the design of discharge treatment measures.
- River surveys using the MoRPh methodology (Shuker et, al 2017) will be completed to determine the ecological and hydromorphological characteristics of the watercourses within the study area. These surveys will inform the: Biodiversity chapter (Chapter 8) in the ES and also the WFD compliance assessment.

Flood Risk Assessment

13.5.2 In accordance with the requirements of the NPPF, an FRA will be prepared to demonstrate how flood risk to the Scheme would be managed now, and when taking future climate change into account.

13.5.3 The FRA is being prepared for the Scheme in consultation with the EA and informed by hydrological and hydraulic modelling of a number of watercourses within the vicinity including the River Etherow and its key tributaries (Glossop Brook and Hollingworth Brook). The FRA would be further developed to inform the design of any necessary flood risk management measures and to provide data to feed into the ES and design.

Water Framework Directive Compliance Assessment

13.5.4 A WFD compliance assessment will be completed to ensure the Scheme is compliant with WFD guidelines. In addition to the DMRB LA113 guidance, the WFD assessment will also follow guidance presented in DMRB LA108 (and will draw upon information presented in Biodiversity chapter (Chapter 8) along with Geology and soils chapter (Chapter 9) to determine impacts to groundwater. The WFD compliance assessment will require site walkover surveys to be undertaken following Advice Note 18, The Planning Inspectorate (The Planning Inspectorate, 2017).

13.5.5 The WFD assessment will comprise of three stages:

- Stage 1 – WFD Screening: identify which WFD water bodies are located within the vicinity of the proposed works, and also a screening to identify any activities associated with the Scheme which do not require any further consideration.
- Stage 2 – WFD Scoping: a desk study exercise to gather baseline information for the WFD water bodies potentially affected by the Scheme complemented by a field visit by geomorphologists to assess the character of the watercourses.

- Stage 3 – WFD Impact Assessment: an assessment to consider the potential impacts (both positive and negative) of the each of the proposed works associated with the Scheme on the Ecological and Chemical elements of the identified WFD water bodies. Measures to contribute to the mitigation or enhancement of the water environment are also proposed, and the assessment also evaluates potential cumulative effects within the Scheme (i.e. intra-scheme) and with other schemes (i.e. inter-scheme).

13.5.6 Consultation with the EA will be undertaken throughout the Scheme to ensure compliance at each stage of assessment.

13.6 Potential Effects and Mitigation Measures

13.6.1 There is potential for the Scheme to affect the water environment during construction and operation. Embedded mitigation will be assessed as part of the ES to determine any residual effects and where necessary, where additional mitigation will be required. The following sections outline any potential effects and appropriate mitigation.

13.6.2 It should be noted that assessment of potential effects is ongoing and is therefore subject to change. Further detailed assessment will be provided within the ES.

Potential Effects

Water Quality

13.6.3 During construction, there is potential for polluted surface water runoff consisting of high sediment load, chemicals, and hydrocarbons from construction vehicles, plant and high-risk activities to enter the surface water features.

13.6.4 During operation, there will be potential for increased pollution to surface water features from road runoff and accidental spillage. The amount of pollution will be dependent on the area of impermeable surface area, length of road and volume of traffic. HEWRAT will be used to assess the potential effects of road drainage pollution and spillages on surface water.

Hydromorphology

13.6.5 Riparian and in-channel vegetation may need to be cleared in order to enable construction works. Similarly, in-channel and near-channel construction works may alter hydrological and morphological processes within the channel, potentially causing alteration to the channel bed and banks. Additionally, increased rates and volumes of surface water runoff could occur resulting from intense rainfall combined with compacted soils and reduced vegetation, which could lead to an increase in sediment loads and pollutants.

13.6.6 During operation, the implementation of new crossings and extensions to existing crossings may result in a loss of open channel. This has the potential to alter the hydromorphological and biological quality of the watercourse. Channel realignments can also alter the hydromorphological and biological quality of the watercourse by changing the channel form and character.

13.6.7 Direct morphological changes due to interactions with the Scheme could result in reduced flow dynamics (uniform or low energy flow types), loss of sediment

continuity, fine sediment deposition, habitat severance, a potential barrier to fish movement and loss of habitat for macrophytes through shading. These physical impacts could affect the status of the watercourses if left unmitigated.

Flood Risk and Hydrology

13.6.8 Construction activities have the potential to cause blockages within watercourses from works materials and / or increased sediment loads giving the potential for increased flooding. Any temporary stockpiling of material in the floodplain could result in a loss of flood storage and / or divert existing overland flow routes to areas that are not currently affected potentially inundating small watercourses.

13.6.9 Ponds constructed to hold water to manage sediment could cause flooding of local watercourses or adjacent land in the event of overtopping or a breach.

13.6.10 It should be noted also that excavation adjacent to the banks of watercourses can increase the risk of overtopping and/or breach of the bank by locally lowering the level of protection or decreasing the integrity of the bank or flood risk asset. This can increase the flood risk to adjacent land and property.

13.6.11 Construction within floodplain may result in additional ponding of surface water due to severance of flow paths and additional surface runoff from increased impermeable area.

13.6.12 During operation, there is a potential for loss of flood storage if the Scheme encroaches on current flood zones. Additionally, new structures crossing watercourses may result in adverse effects on fluvial flood risk elsewhere.

13.6.13 Hydrological impacts may result from the highway being in cutting and the diversion of flows from one catchment to another.

Groundwater

13.6.14 New cuttings, deep foundations and dewatering activities may affect groundwater levels and block, redirect or alter groundwater flow during construction and operation. This has the potential to impact surface water flooding and abstraction receptors.

13.6.15 All other effects (e.g. seepage, dewatering, groundwater quality, settlement impacts) are assessed as part of the Geology and soils chapter (Chapter 9).

Potential Mitigation

Water Quality

13.6.16 During construction, potential mitigation measures will be captured within a Environment Management Plan (EMP) in accordance with DMRB LA 120. Many of these measures are likely to be associated with good site practice and the preparation of robust method statements and will be in line with the requirements set out with the Environment Agency's Pollution Prevention Guidelines (PPGs)[104], for example PPG5 Works and maintenance in or near water (Environment Agency, 2013).

[104] Note. The Environment Agency no longer maintains the PPGs however they are still considered to provide good practice guidance relevant for this type of project. In Scotland and Northern Ireland these are being replaced by Guidance for Pollution Prevention (GPPs) http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/

13.6.17 Where necessary, attenuation storage and treatment for highway drainage would be provided. Sustainable Drainage Systems (SuDs) will be implemented to mitigate the pollution risk associated with road runoff.

Hydromorphology

13.6.18 Mitigation measures during construction will be in line with those proposed for water quality and will be outlined in the EMP and follow PPGs.

13.6.19 During operation, where necessary, 'soft' bioengineering should be prioritised over 'hard' protection to implement a more sustainable design. Vegetation lost during excavation should be reinstated to a ratio of no less than 1:1 and provide enhancements/improvements where possible.

13.6.20 Where culverts are proposed, the length of culvert should be minimised, the culvert should be sized to facilitate any local environmental needs and connectivity with the natural watercourse should be maintained, e.g. through installation of appropriate natural bed substrate, using bed checks or similar bed features to prevent the culvert from becoming perched and vegetation management at the culvert inlet/outlet.

13.6.21 Where river realignments are proposed, appropriate mitigation could include improvements to the hydromorphological and biological quality of the watercourse. The appropriate measures will be proposed based on the outcome of the WFD assessment, consultation with the EA and LLFA (where appropriate) and through discussions with specialists carrying out the biodiversity assessment.

Flood Risk and Hydrology

13.6.22 A drainage strategy will be developed to address the management of surface waters to ensure flood risk to the surrounding area is not increased during construction. Flood Risk Activity Permits and Ordinary Watercourse Consents will be required prior to construction.

13.6.23 Temporary land-take for construction will include adequate areas of land set aside for robust control measures, for example sustainable drainage control. Appropriate management of sediment runoff from the site during construction to reduce risk of blockage in existing structures downstream of temporary outfalls. Any ponds constructed to form runoff and sediment management will be constructed and / or located to avoid the risk of flooding from watercourses or adjacent land in the event of overtopping or a breach.

13.6.24 Hydraulic modelling will quantify any requirements for floodplain compensation as part of the Scheme and additional compensatory storage will be implemented into the design as proposed at the River Etherow crossing.

13.6.25 Where river realignments are proposed, these will be designed to ensure the channel has adequate capacity to manage flood flows.

Groundwater

13.6.26 Groundwater site specific intrusive ground investigation must be undertaken to obtain appropriate groundwater level and quality monitoring in the vicinity of the works.

13.6.27 Where deep foundations extending beneath the groundwater table are designed to be part of the proposed scheme, these should be designed in accordance with industry standards, including Piling Risk Assessment if required - taking into account the site specific water level and flow monitoring data obtained from intrusive ground investigation for the proposed scheme. Any dewatering activities should be compliant with industry standards and best practice.

13.7 Summary

13.7.1 The spatial scope of the assessment has included features of the water environment within 1 km of the Scheme.

13.7.2 The assessment has considered the impacts (both construction and operation) on water quality (both surface and groundwater), flood risk and the compliance with the WFD.

13.7.3 Key water environment receptors within the study area include:

- River Etherow (a WFD watercourse);
- Glossop Brook (a WFD watercourse);
- Hurstclough Brook;
- A number of field drains (ordinary watercourses);
- Secondary A bedrock aquifer; and,
- Secondary B superfcicial aquifers.

13.7.4 The methodology guidance presented in DMRB LA113 will be applied to assign both the importance of the receptors and the impact of the Scheme. The significance of the potential impact shall be determined in accordance with DMRB LA104

13.7.5 Separate FRA and WFD assessments will be carried out to feed into the next stage of the assessment.

14 Climate

14.1 Introduction

14.1.1 This chapter provides a preliminary assessment of the Scheme's effects on climate and its vulnerability to climate change. It identifies the study area, describes the methodology, presents baseline conditions, identifies potential impacts on climate and presents suggested mitigation measures during construction and operation. The approach taken aligns with the guidance set out in Design Manual for Roads and Bridges (DMRB) LA 114 Climate[105] standard.

14.1.2 This chapter has been divided into two sub-sections in order to address the climate change requirements outlined in The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (SI No. 572) (hereafter referred to as the 'EIA Regulations'), which state that the assessment should consider both:

- The potential effects of the Scheme on climate, in particular the magnitude of greenhouse gases (GHGs) emissions emitted during both construction and operation; and
- The vulnerability of the Scheme to climate change, in particular the impacts of extreme weather (caused by climate change) during operation and construction and adaptation to mitigate the effects of these impacts.

14.1.3 For Effects on Climate, insufficient design detail is available to undertake a full assessment of the construction and operation phase at the time of preparing this chapter, as is proportionate for this stage of the design. This PEIR presents calculated construction and operation phase emissions for elements of the Scheme and uses these to indicate any potential significant effects of the Scheme. A full assessment will be undertaken and presented as part of the ES.

14.2 Study area

Effects of Scheme on carbon

14.2.1 The study area comprises the emission of GHGs resulting from the Scheme in its construction and operation phases. The study area is not limited to the geographic extent of the Scheme itself, as many emissions will result from upstream, downstream, and off-site activities such as materials production. In operation, the study area is consistent with the affected road network defined in the traffic model.

14.2.2 The study area has been determined based on DMRB LA 114, the boundaries and scopes of Highways England's Carbon Tool, and PAS 2080:2016 'Carbon Management in Infrastructure', which is the technical standard for measuring and managing GHG emissions from infrastructure.

Vulnerability of the Scheme to climate change

14.2.3 The study area for assessing the Scheme's vulnerability to climate change will be based on the DCO boundary. It will also include compound areas and temporary land

[105] https://www.standardsforhighways.co.uk/dmrb/search/87f12e4f-70f8-4eed-8aed-9e9a42e24183

take needed during construction and the area of all the receptors examined by the other environmental topics in this report.

14.3 Methodology

Effects of Scheme on carbon

Level of assessment

14.3.1 DMRB LA114 advises on the level of assessment which should be carried out, based on the expected level of data availability at the project stage. Where there is insufficient reliable information for quantitative assessment, for example in the early stages of project development, a qualitative assessment of GHG emissions should be carried out.

14.3.2 Much of the design detail required for a full quantitative assessment is not yet available. However, some data on the emerging design is available for key materials and wastes. For this reason, a semi-quantitative assessment has been undertaken, which quantifies emissions from some key elements to identify the potential for significant effects. Other aspects of the design have been considered in a qualitative manner. A fully quantitative assessment will be provided in the ES.

14.3.3 The life cycle stages and GHG sources presented in 14-1 are included within the assessment, with reference to the type of assessment which has been carried out.

Table 14-1 - Sources and lifecycle stages for project GHG emissions

Main stage of project life cycle	Sub-stage of life cycle	Potential sources of GHG emissions (not exhaustive)	Type of assessment
Construction stage	Product stage; including raw material supply, transport and manufacture.	Embodied GHG emissions associated with the required raw materials.	Quantitative assessment of materials from emerging design.
	Construction process stage; including transport to/from works site and construction /installation processes.	Activities for organisations conducting construction work	Qualitative assessment.
	Land use change.	GHG emissions mobilised from vegetation or soil loss during construction.	Qualitative assessment.
Operation stage (in line with appraisal period)	Use of the infrastructure by the end-user (road user).	Vehicles using highways infrastructure.	Quantitative assessment.
	Operation and maintenance (including repair, replacement and refurbishment).	Energy consumption for infrastructure operation and activities of organisations conducting routine maintenance.	Qualitative assessment.
	Land use and forestry.	Ongoing land use GHG emissions/sequestration each year.	Qualitative assessment.
Opportunities for reduction	GHG emissions potential of recovery including reuse and recycling GHG emissions potential of benefits and loads of additional functions associated with the study system.	Avoided GHG emissions through substitution of virgin raw materials with those from recovered sources.	Qualitative assessment.

Table Source: adapted from LA 114 Climate

Calculating emissions

14.3.4 Emissions calculations are carried out by multiplying activity data by an emission factor associated with the activity being measured. Activity data is a quantitative measure of an activity that results in emissions during a given period of time, (e.g. kilometres driven, kWh electricity consumed, tonnes waste sent to landfill). An emission factor is a measure of the mass of emissions relative to a unit of activity.

Construction

14.3.5 The partial quantitative assessment for construction phase emissions has been carried out using Highways England's Carbon Tool, and is based on the available data of the following categories:

- Bulk materials;
- Earthworks;
- Fencing, barriers and road restraint systems;
- Drainage;
- Road pavements;
- Street furniture;
- Civil structures and retaining walls; and
- Waste.

14.3.6 The carbon emissions from fuel, electricity and water use and related to business and employee transport will also be included in the ES.

14.3.7 It is not currently known where materials will be sourced from or how they will be transported to site. An assumption has been applied that material will be sourced regionally (represented by a standard transport distance of 100 km) and be transported by HGV.

Operation

14.3.8 Operational emissions have been calculated separately from Highway England's Carbon Tool, which is focused specifically on construction-phase emissions. Road user carbon emissions have been modelled in accordance with DMRB LA 105. Emissions have been calculated using Defra's Emissions Factors Toolkit (v9) which was the latest available at the time of the Air Quality assessment in July 2020[106], which takes account of Department for Transport fleet projections including conventional vehicles (petrol and diesel) as well as hybrid and electric vehicles.

14.3.9 There is no operational energy use or maintenance and repair data available for the Scheme at the time of writing this document.

Emissions Analysis and Significance Assessment

14.3.10 As part of the full assessment in the ES, the emissions calculated for the Do Something scenario (i.e 'with scheme', Section 4.6.2) of the Scheme will be compared against the Do Minimum scenario (i.e 'without scheme', Section 4.6.2) baseline for the assessment years. The difference between these emissions can be considered to be the impact of the Scheme.

14.3.11 There is no accepted technical or policy guidance on how to determine the significance of a project's effects on climate. However, the National Networks National Policy Statement (NN NPS) acknowledges that the emissions from the construction and operation of a road scheme are likely to be negligible compared to

[106] Note: There has since been an update to the Defra's Emissions Factor Toolkit to Version 10.1, the implications of which would be considered in the Environmental Statement. Defra Emissions Factors Toolkit V10.1

total UK emissions, and are unlikely to materially impact the UK Government's ability to meet its carbon reduction targets: *'it is very unlikely that the impact of a road project will, in isolation, affect the ability of Government to meet its carbon reduction plan targets'.*

14.3.12 For this reason, it is considered unlikely that Scheme emissions will be of a quantity great enough to cause a significant effect on climate.

14.3.13 However, due to the global scale, long-term duration and cumulative and irreversible nature of the impact, the effects on climate of the Scheme are still considered important. Highways England is committed to reducing emissions where practicable, and therefore emissions have been quantified and presented as part of the ES.

14.3.14 Following the determination of emissions, mitigation measures to reduce emissions will be recommended in the ES.

Vulnerability of the Scheme to climate change

14.3.15 The assessment method of the Scheme's vulnerability to climate change is set out in this section. It follows guidance set out in DMRB Climate: LA 114 and will be informed by best practice climate assessment approaches and literature as well as professional judgement.

14.3.16 There are four stages to the assessment process:

- Stage 1 – Receptors which may be affected by climate change have been identified with consideration of both extreme weather events and gradual climatic changes in the study area over the Scheme's design life.
- Stage 2 – The likelihood of potential climate changes and events occurring will be determined using available data (such as the known recurrence interval of extreme weather events) and professional judgement.
- Stage 3 – The consequence of climate change impacts on the Scheme receptors will be categorised using the criteria within DMRB LA 114.
- Stage 4 – Determine the significance of each impact based on a combination of the likelihood of an impact occurring and the consequences of that impact.

14.3.17 The assessment will be undertaken with consideration of the Scheme design and embedded mitigation. Where mitigation in addition to that which is embedded in the design is required, i.e. additional measures to reduce otherwise significant impacts, these will be presented in the residual effects section prior to reassessment of the impacts significance. If residual (non-significant) cumulative effects remain in the environmental assessment, then measures to manage the ongoing risks will be identified.

14.4 Existing Environmental Conditions

Effects of Scheme on carbon

National Emissions Baseline

14.4.1 Global greenhouse gas emissions, from all sources, currently amount to approximately 50 billion tonnes of CO_2e[107] per year. The UK is the world's eighth largest emitter of CO_2e, with the total background UK emissions for 2017 (the last reported year) being 460 million tonnes of CO_2e[108]. The transport sector was the largest emitting sector of UK greenhouse gas emissions in 2017, emitting 27% of all emissions. Of all sectors, it has also shown the least reduction since the 1990 baseline, at only 2%. For comparison, the next smallest reductions are seen in the residential and agriculture sectors at 16%.

14.4.2 The UK has in place carbon budgets for five-year periods up to 2032[109]. The UK is currently in the third carbon budgetary period (2018-2022), the budget for which is 2,544 MtCO2e. The UK cannot legally emit more greenhouse gases than this within the budgetary period. The carbon budget for the 2023–2027 budgetary period is 1,950 MtCO2e, and the budget for 2028-2032 is 1,725 MtCO2e. Whilst budgets are not set beyond this, there is a legal requirement for the UK to reach 0 MtCO2e by 2050.

14.4.3 Scheme-specific baseline emissions equate to emissions in the Opening Year and Design Year assuming the Scheme was not constructed (the Do-Minimum scenario). Road user vehicle emissions in the Do-Minimum Scenario for 2025 and 2040 are :

- Opening Year (2025): 761,085 tCO2e
- Design Year (2040): 818,629 tCO2e

14.4.4 There are no construction emissions associated with the Do-Minimum scenario.

Vulnerability of the Scheme to climate change

Baseline conditions

14.4.5 Climate is defined as the typical weather conditions experienced in a place over a period of time, conventionally expressed as average weather over a 30-year period.

14.4.6 The baseline for climate change vulnerability is presented in two parts:

- The first section describes the current climatic conditions in the study area; and
- The second presents a range of possible future climate projections.

14.4.7 It should be noted that climate change is not only a challenge for the future. We are already observing changes in the UK climate.

Current climate

14.4.8 The Scheme is in the Met Office's North West (NW) England climate zone. Mean annual temperatures over the region depend very much on altitude and, to some

[107] UK GHG Emissions
[108] www.UK.gov 2017 Final UK greenhouse gas emissions national statistics
[109] https://www.gov.uk/guidance/carbon-budgets

extent, proximity to the coast. July is the warmest month, with mean daily maximum temperatures of about 21 °C in Cheshire, but only 17 °C to 18 °C on the Isle of Man and in upland areas such as the Pennines and Lake District.

14.4.9 The exposure of NW England to westerly maritime air masses and the presence of extensive areas of high ground mean that the region has some of the wettest places in the UK. The higher parts of the Lake District are particularly wet, with an average of over 3200 mm of rain each year. In contrast, the reputedly wet city of Manchester averages only 830 mm and the more sheltered areas of Cheshire and the Eden valley in Cumbria are even drier with less than 800 mm per year. These areas benefit from the 'rain shadow' effect of the high ground of North Wales and the Lake District respectively.

14.5 Other baseline information to be obtained/surveys to be undertaken

Effects of Scheme on carbon

14.5.1 The PEIR presents the partial carbon emission assessment due to the limitation of the data availability at this stage. The complete assessment of construction stage and operation stage of the scheme will be updated in the ES based on the design data.

Vulnerability of the Scheme to climate change

Other baseline information to be obtained on the current climate

14.5.2 The ES will include a detailed examination of the current climate baseline using the Met Office's latest regional dataset of 30-year averages and data from nearby long running meteorological stations. The closest meteorological stations to Mottram in Longdendale are Woodford and Rochdale.

Projected future climate

14.5.3 The study area is likely to experience hotter and drier summers and warmer and wetter winters. Alongside these changes in average conditions, it is possible, but less certain, that climate change will also increase the frequency and severity of extreme weather events; such as: heavy rainfall, storms and heatwaves.

Other baseline information to be obtained on the projected future climate

14.5.4 The ES will include a detailed consideration of the projected future climate baseline. This will use climate projections from UKCP18 (United Kingdom Climate Projections 2018). These projections have been developed by the Met Office Hadley Centre Climate Programme which is supported by the Department of Business, Energy and Industrial Strategy (BEIS) and the Department for Environment, Food and Rural Affairs (Defra). They provide the most up-to-date assessment of how the climate of the UK may change over the 21st century.

14.6 Potential effects and mitigation measures

Effects of Scheme on carbon

Construction Effects

14.6.1 The total construction phase emissions cannot yet be quantified due to lack of design data. However, it is known that the construction stage of the Scheme would have an overall adverse effect on climate, as it would give rise to emissions. These emissions would arise from the production of materials to be used in construction and those emitted onsite through construction activities (for example from emissions from diesel-fueled construction plant).

14.6.2 'Full' construction emissions will be calculated and presented as part of the ES. The partial assessment is presented in the Table 14-2.

Table 14-2 - Emission from key materials at construction stage

Category	Items	GHG emissions (tCO_2e)
Bulk Materials	Asphalt, fill / aggregate, reinforcement steel, poured concrete,	15,361
Earthworks	Soil (Imported, stabilised)	7,782
Fencing	Fencing, barriers, road restraint systems	510
Drainage	Pipework, gullies, channel and slot drains, headwalls	777
Road Pavements	Kerb	120
Street Furniture	Road lighting and columns, signage	402
Civils Structures	Piling, Formwork, Shuttering	6,334
Waste	Aggregate and soil exported, mixed construction and demolition waste	6,986
Total		31,286

14.6.3 On-site construction processes will also generate emissions from use of fuel, electricity and water, and worker travel to site. Removal vegetation during site clearance and disturbance of soils will also release greenhouse gases. These will be assessed in detail in the ES.

Operation Impacts

14.6.4 The Scheme is anticipated to increase operational emissions from road user vehicles, as shown in Table 14-3.

Table 14-3 - Emission from key materials at operation stage

	Annual emissions (tCO_2e)	
Scenario	**2025**	**2040**
Do Minimum	761,085	818,629

	Annual emissions (tCO_2e)	
Scenario	**2025**	**2040**
Do Something	770,769	829,455
Impact of the Scheme	9,684	10,826

14.6.5 Emissions will also be generated by maintenance activities, and generation of electricity consumed by assets such as lighting. Depending on the type of vegetation and landscaping around the Scheme, the land itself may emit or sequester greenhouse gases. These elements will be assessed in the ES.

Comparison to UK Carbon Budgets

14.6.6 A comparison of the magnitude of Scheme emissions with the UK's carbon budgets will be presented in the ES and used to establish a level of significance of the effects on climate. Without a full quantitative assessment having been undertaken, it is not considered that the magnitude of emissions is sufficient to significantly affect the UK meeting its carbon budgets, in line with the conclusions drawn in the NN NPS.

Residual Impacts

14.6.7 Due to the embedded nature of the mitigation measures proposed throughout the design, some of which have already been incorporated into the design (for example, selection of route length) and some of which are yet to be incorporated, it is not practicable to complete a quantitative assessment of 'before' and 'after' mitigation. Rather, the assessment shows a snapshot of the current design.

Cumulative Effects

14.6.8 The effects of GHG emissions are essentially cumulative; it is their concentration in the atmosphere, not the actual level of emissions, that determines the warming effect (i.e. it is the 'stock' rather than the 'flow' which is important). In addition, it is the global excess of emissions from human activities all over the world that contributes to the overall effect on climate, not only local emissions. For this reason, the impact of the Scheme should be considered in the context of overall emissions from the UK and globally. Compared with global emissions the scale of the impact of the Scheme is negligible. However, the overall effect on climate of GHG emissions is made up of many small emissions sources, of which this project would contribute.

NPS Compliance

14.6.9 The NN NPS (paragraphs 5.16 to 5.19) acknowledges that the emissions from the construction and operation of a road scheme are likely to be negligible compared to total UK emissions, and are unlikely to materially impact the UK Government's ability to meet its carbon reduction targets. However, the NN NPS requires evidence of the emissions impact of a scheme, an assessment of the emissions against the Government's carbon budgets, and evidence of mitigation measures. The assessment presented in this chapter provides the required evidence and assessment against targets.

Mitigation

14.6.10 Design and mitigation should be carried out in line with DMRB LA 114, which uses the principles set out in PAS 2080:2016 'Carbon Management in Infrastructure'. DMRB LA 114 states that: *'Projects shall seek to minimise carbon emissions in all cases to contribute to the UK's target for net reduction in carbon emissions'*.

14.6.11 Emissions should be mitigated by applying Highways England's carbon reduction hierarchy: Avoid / Prevent, Reduce, Remediate. As a project progresses, the opportunity to make significant carbon reductions reduces, and the cost and disruption associated with those changes increases. It is therefore important to plan to integrate these opportunities from this early project stage.

- Avoid / prevent:
  - Maximise potential for re-using and / or refurbishing existing assets to reduce the extent of new construction required; and
  - Explore alternative lower carbon options to deliver the project objectives (i.e. shorter route options with smaller construction footprints).
- Reduce:
  - Apply low carbon solutions (including technologies, materials and products) to minimise resource consumption during the construction, operation, user's use of the project, and at end-of-life;
  - It is recommended that as far as possible, materials are locally procured to minimise transportation emissions; and
  - Construct efficiently, using techniques (e.g. during construction and operation) that reduce resource consumption over the life cycle of the project;
- Remediate:
  - After addressing steps 1 and 2 projects will identify, assess and integrate measures to further reduce carbon through on or off-site offsetting or sequestration.

14.6.12 Potential mitigation measures relevant to the construction and operation stages of the Scheme are suggested in Table 14-4 below.

Table 14-4 - Construction emissions mitigation measures

Life cycle module	Mitigation measures
Materials	Reduction of materials consumption should be carried out in accordance with the mitigation measures outlined in the Materials and Waste Chapter. In addition, consideration should be given to alternative low carbon materials e.g. recycled aggregates, cement substitution etc.
Transport	Materials transportation should be reduced and/or avoided by minimising the quantity of materials required. Additionally, where possible detailed design and procurement measures should be specified to minimise the necessity to source materials from long distances.

Life cycle module		Mitigation measures
Construction Processes	Construction plant use	Construction plant emissions should be minimised by designing for efficient construction processes as part of design development. During construction, plant emissions should be managed via the Environmental Management Plan (EMP) in accordance with DMRB LA 120, which should specify plant operator efficiency requirements.
	Construction water use	Construction water consumption should be minimised by designing for efficient construction processes as part of design development. During construction mains water consumption should be managed via the EMP, which should specify reduction and reuse measures.
	Construction waste transportation	Reduction of waste generation should be carried out in accordance with the mitigation measures outlined in the Material Assets and Waste chapter (Chapter 10)
	Construction waste off-site processing	Waste treatment/disposal should be carried out in accordance with the mitigation measures outlined in the Material Assets and Waste chapter (Chapter 10)
	Employee commuting	Local contractors should be used where possible, reducing the distance driven by employees.

14.6.13 Operational emissions can be mitigated by designing a Scheme which minimises emissions from traffic and operational energy use. Potential mitigation measures for reducing in-use emissions are shown in Table 14-5.

Table 14-5 - Operation emissions mitigation measures

Life Cycle Module	Mitigation Measures
Road user carbon	Mitigation of in-use emissions should be explored based on examination of traffic management scenarios over the network. Inclusion of Non-Motorised User (NMU) routes would encourage the utilisation of alternative means of transport and help achieve the goal of creating a more integrated and sustainable transport network, whilst reducing emissions.
Maintenance and repair	The mitigation measures detailed for the construction stage are also applicable to ongoing maintenance and repair.
Operational energy use	Operational energy use should be minimised by designing for use of low energy lighting and traffic management systems, specification of controls that minimise on-time, and use of low carbon energy sources, where practicable.

Vulnerability of the Scheme to climate change

14.6.14 The potential climate vulnerability impacts associated with the scheme during construction and operation are summarised below, they are separated by the receptor types as they are defined in LA114.

Construction

Construction processes

14.6.15 If construction coincides with extreme weather, there may be impacts on the Scheme, for example:

- During a heatwave the construction programme and activity schedule may need to be reviewed with those activities that are less vulnerable to the hot weather being prioritised;
- Construction staff health issues (e.g. heat stroke, dehydration, respiratory problems) could accompany work during a heatwave and/or time of reduced air quality;
- During fog, lightning or high winds it may not be possible to work safely, for example operating tall cranes or erecting scaffolding for work on bridges; and
- During drought the construction schedule may be vulnerable to disruption if water availability is limited.

14.6.16 It is noted that if construction coincides with extreme weather, there may also be environmental impacts. Assessment of these will be included within the relevant environmental topic chapter. For example, potential adverse impacts associated with surface water runoff from construction sites will be assessed within the Road Drainage and the Water Environment chapter (Chapter 13).

Operation

Potential operational impacts on assets (including their operation, maintenance and refurbishment)

14.6.17 Potential operational impacts on asset receptors (including their operation, maintenance and refurbishment):

- Road surfaces and pavements:
  - Warmer winters could reduce winter maintenance and associated traffic disruption (less road salting and freeze thaw damage).
  - Hotter summers could damage materials (rutting, shrinkage and expansion) increasing maintenance requirements and associated traffic disruption.
  - Heavier rain and wetter winters could increase pothole formation (by weakening the soil beneath the carriageway) increasing maintenance requirements and associated traffic disruption.
- Structures (including embankments, earthworks and bridges):

- Hotter summers could reduce the asset lives of structures (over expansion and buckling) increasing maintenance requirements and associated traffic disruption.
- Drier summers could cause soil instability (intensify and extend soil moisture deficits and impact groundwater levels and earth pressures) increasing maintenance requirements and associated traffic disruption.

- Drainage infrastructure:
  - Drier summers in combination with hotter temperatures could dry out soils and subsequently increase erosion. This may cause sedimentation within the Scheme's drainage infrastructure that reduces its drainage capacity and so increases the risk of flooding causing traffic disruption. Additional maintenance work to prevent flooding may also cause traffic disruption.
  - Heavier rain and wetter winters could increase the risk of pluvial or surface flooding. Flooding and additional associated maintenance requirements could both cause traffic disruption.
  - Warmer winters could reduce freeze thaw erosion which can damage underground assets. Reducing maintenance requirements and associated traffic disruption.
- Road technology and street furniture:
  - The frequency of extreme weather impacts on electrical equipment may increase, for example lightning strikes become more regular and extreme, and hot temperatures become more common causing thermal over loading of circuits. Repair and maintenance may cause traffic disruption.
  - High winds in more regular storms could overload small structures and signage and damage roadside planting and furniture. Repair and maintenance may cause traffic disruption.
- Landscaping:
  - Drier summers could damage the Scheme's landscaping. More regular maintenance may cause traffic disruption.

Potential operational impacts on end-user receptors:

- Driver experience:
  - Warmer winters could improve winter driver safety (less ice) and so reduce traffic disruption caused by accidents.
  - Hotter summers could increase the number of vehicle breakdowns and so increase traffic disruption and the number of associated accidents.
  - Hotter summers could increase accident rates and so increase traffic disruption.
  - Heavier rain and wetter winters could reduce driver safety and so increase traffic disruption associated with accidents.
  - Storms and high winds could reduce driver safety and so increase traffic disruption associated with accidents.

Mitigation

14.6.18 The Scheme will implement a wide range of climate vulnerability mitigation measures. These will be presented in the ES once further design information is available. They will primarily include design modifications (embedded mitigation), such as the inclusion of a climate change allowance in the selection of the design storm size that the drainage infrastructure will be built to manage.

14.7 Summary

Effects of Scheme on carbon

14.7.1 A 'full' quantitative assessment has not been possible for the construction phase of the Scheme due to unavailability of design data, as is proportionate for this stage of the design. This will be presented in the ES. The partial quantitative assessment of carbon emission for the construction phase based on the material assessment identified that the Scheme has the potential to generate at least 31,286 tCO_{2e}.

14.7.2 In the Opening Year, vehicle emissions will generate an additional 9,684 tCO_2e with the Scheme, compared with the Do Minimum Scenario.

14.7.3 Although the Scheme will lead to an increase in emissions during construction and operation, it is not considered that the magnitude of emissions is sufficient to significantly affect the UK meeting its carbon budgets, in line with the conclusions drawn in the NN NPS.

14.7.4 The PEIR presents the partial carbon emission assessment due to the limitation of the data availability at this stage. The complete assessment of construction stage and operation stage of the scheme will be updated in the ES based on the design data.

Vulnerability of the Scheme to climate change

14.7.5 The Scheme has the potential to be affected by climate change.

14.7.6 The PEIR presents an overview of the potential climate vulnerability impacts associated with the scheme during construction and operation and the mitigation, which will primarily include design modifications.

14.7.7 The ES will include a more detailed assessment of the vulnerability of the Scheme to climate change. This will include examination of the current and projected future climate baseline, identification of specific mitigation to be incorporated into the Scheme's design and operational processes and an assessment of the residual climate change vulnerability of the Scheme

15 Cumulative effects

15.1 Introduction

15.1.1 This Chapter brings together the initial findings of each of the environmental topic areas identifying and assessing the cumulative effects of the Scheme, in accordance with the EIA directive. Cumulative effects are effects that result from two or more impacts acting together on a single receptor. This Chapter details the potentially significant effects as a result of "combined effects" and "cumulative effects."

15.1.2 As set out in the Design Manual for Roads and Bridges (DMRB) LA 104 Environmental assessment and monitoring[110] standard, combined and cumulative effects are defined as:

- Combined effects: Effects which arise from the reaction between effects of a single project on different aspects of the environment, e.g. numerous different effects impacting a single receptor.
- Cumulative effects: Effects that result from additive effects caused by different projects together with the project being assessed.

15.1.3 For the assessment of combined effects, the technical assessments (i.e. the different topics referred to in this PEIR) need to be well progressed. Likewise, the assessment of cumulative effects is reliant upon data relating to other developments in proximity to the Scheme being confirmed and as up to date as possible, which will be informed by discussions with the Local Planning Authorities. Therefore, this chapter sets out a proportionate level of assessment for the information currently available.

15.2 Assessment Methodology

Combined effects

15.2.1 Combined effects occur between different environmental topics within the same proposal and as a result of the development's direct effects i.e. combined effects as a result of the Scheme. An example of a combined effect is where the removal of vegetation would potentially have a direct impact upon landscape, visual amenity and biodiversity due to the loss of the amenity/habitat as well as indirect effects on loss of vegetation screening on adjacent residential receptors.

15.2.1 The assessment methodology for combined effects requires the identification of impact interactions associated with the Scheme upon separate environmental receptors

15.2.2 The assessment considers significant adverse residual effects, after mitigation has been taken into account. These residual effects are set out within the individual environmental topics of the ES and reviewed against the receptors they affect. Where there is more than one effect on a particular receptor, there is a requirement to determine whether there is the potential for an interaction between the environmental topics.

[110] https://www.standardsforhighways.co.uk/dmrb/search/0f6e0b6a-d08e-4673-8691-cab564d4a60a

15.2.3 If there is the potential for an interaction, it will be determined through professional judgement whether there is the potential for a significant combined effect on that receptor.

15.2.4 Only residual effects which are classified as being of minor, moderate, or major significance will be considered in relation to the potential for combined effects Residual effects of negligible significance are considered to be imperceptible to a receptor.

15.2.5 .Where a receptor has been identified as only experiencing one effect or where only one topic has identified effects on that receptor, there is no potential for combined effect to occur.

15.2.6 The study area for the combined effects assessment is defined by the study areas of each of the individual environmental topic assessments, which are discussed in the relevant topic chapters and set out in Table 15-1.

15.2.7 The receptors considered in this assessment are sub-divided into six groups:

- Humans - including residents, including community and private assets, sensitive receptors and sensitive or vulnerable groups
- Ecological features including protected sites, species and existing habitats;
- Built heritage features including buildings, artefacts, structures, areas and precincts that are of historic, aesthetic, architectural or cultural significance (also includes natural features such as hills, groves or water bodies)
- The water environment including surface water receptors including WDF waterbodies, water quality, groundwater, aquifers, ground water abstractions and flood risk;
- All travellers including vehicle travellers, cyclists, pedestrians and equestrians; and
- Community assets and businesses including land, building and infrastructure providing a service/ resource to a community, e.g. open spaces, village greens, village halls, health care and education facilities as well as land and buildings for the purpose of commercial/industrial enterprise and agriculture.

15.2.8 The potential effects acting upon these receptors are primarily changes in traffic, noise, air quality, visual effects, and the physical environment (i.e. water, ecology). The assessment considers residual effects, i.e. effects that remain after mitigation has been applied.

15.2.9 Combined effects of moderate and above (adverse or beneficial) are considered significant.

Cumulative effects

15.2.10 Cumulative effects are those that occur as a result of the combined action of a number of different projects (defined as ‘other development’) cumulatively with the Scheme being assessed and on a single receptor.

15.2.11 For the assessment of cumulative effects, Planning Inspectorate (PINS) 'Advice Note Seventeen: Cumulative Effects Assessment[111]' is considered to represent best practice for cumulative effects assessments in relation to DCO projects.

15.2.12 This Advice Note sets out a process involving 4 ‘stages’ which should be undertaken to assess cumulative effects, these are outlined below.

- Stage 1: Establish the project’s ZOI and identify long list of ‘other development’
- Stage 2: Identify shortlist of ‘other development’ for the cumulative effects assessment
- Stage 3: Information Gathering – collate available information regarding the shortlisted ‘other development’ to inform the cumulative effects assessment
- Stage 4: Assessment – assess the cumulative effects of the Scheme with the ‘other development’ based on factors including duration of effect, extent of effect, type of effect, frequency of the effect, value and resilience of receptors and likely success of mitigation.

15.2.13 Stage 1 of the process is done by establishing an appropriate ‘Zone of Influence’ (ZOI) for each topic. This reflects the study areas identified within the relevant environmental topic chapters of this PEIR (Chapters 5 to14). These are set out in Table 15-1 below:

Table 15-1 Zone of influence/ Study area for Combined and Cumulative Effects assessment

Environment Topic	Zone of Influence/ Study area
Air Quality	• 200 m from roads affected by changes in traffic during construction; and • 200 m from the DCO boundary and other affected roads during operation.
Cultural heritage	• Within 500 m of the DCO boundary
Landscape and visual effects	• Landscape effects within 1 km from the perimeter of the Scheme; and • Visual effects within 1 km from the edge of the Scheme
Biodiversity	• 30 km for Special Areas of Conservation (SACs) where bats are a qualifying feature; • 5 km for bats; • 2 km for statutory designated sites of nature conservation importance, including European designated sites and nationally designated sites: (SAC, SPA, Ramsar, NNR, LNR) • 2 km for non-statutory LWSs and Roadside Nature Reserves (RNRs); • 1 km for notable habitats, ancient woodland, notable or legally protected species and invasive plant species; • 500 m for waterbodies; and, • 50 m for veteran trees

[111] https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf

Environment Topic	Zone of Influence/ Study area
Geology and Soils	• Within 500 m of the DCO boundary
Waste and material assets	• For material resources, the study area includes the demand for key construction materials nationally; and • For waste, the study area includes the waste arisings and waste infrastructure capacity of Greater Manchester and Derbyshire. A cumulative approach has already been taken for Waste and materials assets due to the widely availability of material resources and the design and mitigation measures that would be implemented for cumulative developments, due to policy requirements, it is considered that not further cumulative assessment would be required.
Noise and Vibration	• For construction effects, 300 m from the construction footprint of the site and roads used by construction traffic. • For operational effects, 600 m from the carriageway edge of any proposed new routes or existing routes to be bypassed or improved, and 600 m from any other affected routes within 1 km of the proposed new routes or altered existing routes
Population and human health	• Within 500 m of the DCO boundary where likely effects are identified outside the 500 m area surrounding the project boundary, the study area will be extended accordingly.
Road Drainage and the Water Environment	• As a minimum, the catchment of any watercourses crossed by the Scheme; • Groundwater – assessed on the underlying Water Framework groundwater body and any associated wetlands that are dependent on groundwater flows and • For cumulative effects any surface water outfalls originating from the scheme that outfall into the same watercourse will be considered. Any other developments that have the potential to discharge into the same watercourse or cross the same watercourse as the Scheme will also be considered
Climate	• Climate Change impact is in itself a cumulative effect of all human actions (including development) and therefore deemed not assessable for combined and cumulative effects • Due to the inherent combined effects of Climate Change, these will be picked up in the environmental topic chapters e.g. Ecology, Road Drainage and the Water environment, Air Quality etc. and are therefore already assessed. For this reason, Climate Change has been excluded from the CEA to avoid double counting effects

15.2.14 As outlined in DMRB LA 104, , the assessment should establish a list of projects which have the potential to result in cumulative impacts. These projects are interpreted as ‘reasonably foreseeable’ or ‘committed’ developments, which include (but not limited to):

- Roads projects which have been confirmed for delivery over a similar timeframe, which are considered to be those developments that will be delivered before or shortly after the full year of the Scheme opening (2025). ;
- Other development projects with valid planning permissions or consent orders, and for which EIA is a requirement; and

- Proposals in adopted development plans with a clear identified programme for delivery.

15.2.15 The thresholds and spatial areas are defined according to the type of development outlined below:

- Nationally significant projects: projects that are listed on the PINS Programme of Projects. For this Scheme, no NSIPs have been identified in the study area (within 10 km radius of the Scheme).
- Regionally Significant Project: a project that has been included within the traffic model and therefore deemed to be of regional significance. This is in line with the traffic model for the Scheme. It is not considered appropriate to align the assessment with the complete scale of the transport model for the Scheme as this includes data from across the whole country, selected significant major developments within the whole of Tameside MBC, High Peak Borough Council, Sheffield City Council, Barnsley Council, Manchester City Council, Trafford Council as well as accounting for general growth.
- Major development and Minor development have been defined in accordance with Article 2 of the Town and Country Planning Development Management Procedure (England) Order 2015[112]. Thresholds for a major development includes more than 10 new houses, a site area of 0.5 ha (and above) and all mineral and waste developments. A minor development is one below the thresholds for a major development.

15.2.16 The following spatial areas are defined from the assumption that larger, more significant; developments will have wider ranging environmental effects than smaller and more local developments:

- NSIPs – All projects listed on the PINS programme of Projects - 10 km from the DCO boundary;
- Regionally Significant Projects – all regionally important projects included in the traffic model – 3 km from the DCO boundary;
- Major development – within and 1.5 km from the DCO boundary; and
- Minor development – within the DCO boundary.

15.2.17 The developments for the cumulative effects assessment will be identified and year specific assumptions made for the assessments looking at the anticipated peak year of construction and first year of operation. Liaison will be undertaken with the relevant Local Planning Authorities to determine and agree whether any other schemes in the vicinity of the proposed Scheme should be taken into consideration and when they believe them likely to come forward.

15.2.18 For traffic related cumulative effects, several environmental topic assessments have been based on information relating to the affected road network and traffic flows. As highlighted in paragraph 15.2.13, all regionally important projects included in the traffic model. The topics that make significant use of the outputs from the traffic model are Air Quality and Noise and Vibration. The traffic flow information from the traffic

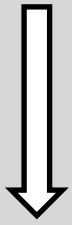
[112] https://www.legislation.gov.uk/uksi/2015/595/article/2/made

model also influences the Biodiversity, Road drainage and the water environment and Climate assessments.

15.2.19 As part of Stage 2, the Long List of developments has been reviewed and filtered against the threshold criteria identified in paragraph 15.2.10. The key projects shortlisted for further consideration at Stage 2 are summarised in Table 15-2These are subject to change as more up to date information is collated as part of the assessment for the ES.

15.2.20 As part of Stage 3, the 'other developments' identified will then be grouped into tiers in accordance with PINS Advice Note 17. This grouping reflects the likely degree of certainty attached to each development, with Tier 1 being the most certain and Tier 3 being the least certain and most likely to have limited publicly available information to guide the assessment. A description of the tiers is provided in Table 15-2.

Table 15-2 Degree of certainty available for each tier

Tier	Likely degree of certainty	Level of detail
Tier 1	• Under construction*. • Permitted application(s) whether under the Planning Act 2008 or other regimes but not yet implemented. • Submitted application(s) whether under the Planning Act 2008 or other regimes but not yet determined.	Decreasing level of detail likely to be available 
Tier 2	• Projects on the Planning Inspectorate's Programme of Projects where a Scoping Report has been submitted.	
Tier 3	• Projects on the Planning Inspectorate's Programme of Projects where a Scoping Report has not been submitted. • Identified in the relevant Development Plan (and emerging Development Plans - with appropriate weight being given closer to adoption) recognising that information on any relevant proposals will be limited. • Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals where such development is reasonable likely to come forward.	
* Where other projects are expected to be completed before construction of the proposed NSIP and the effects of these projects are fully determined, effects arising from them should be considered as part of the baseline and may be considered as part of the construction and operation assessment.		

15.2.21 Only Stage 1 and a provisional list has been developed as part of Stage 2 have been undertaken at this preliminary phase of the assessment. This has been done to keep the assessment proportionate and focused so that 'other development' is only taken through to further assessment stages if it has potential to give rise to significant cumulative effects. This is determined by the scale and nature, timing and proximity of the 'other development' which will be developed further as part of the ES.

15.3 Potential impacts

Combined effects

15.3.1 Table 15-3 highlights the potential interactions (shaded in purple) between environmental topics for the Scheme. These combined effects further detailed in Table 15-4. At this stage, Table 15-3 and 15-4 provide an outline of the potential combined effects between environmental topics and does not indicate the level of significance of these impacts. This will be determined after the full assessment has been undertaken for the ES.

Table 15-3 Potential Interaction between Environmental Topics

	Air quality	Cultural heritage	Landscape and visual effects	Biodiversity	Geology and soils	Noise and vibration	Population and human health	Road drainage and water environment
Air quality		■		■			■	
Cultural heritage	■		■			■		
Landscape and visual effects		■		■		■	■	■
Biodiversity	■		■			■	■	■
Geology and soils							■	■
Noise and vibration		■	■	■			■	
Population and human health	■		■	■	■	■		
Road drainage and water environment	■		■	■	■			

Key

■ Purple box indicates a combined effect

Grey box indicates no combined effect

Table 15-4: Combined potential impacts

Environmental Topic	Construction Combined effects	Operational Combined effects
Air Quality	There is the potential for elevated dust deposition and soiling at properties within 200 m of the construction site boundary as a consequence of the works . Additionally, an increase in vehicle movements is expected to occur during the construction period, associated with the transport of materials, plan and labour to and from site. Air quality effects due to construction would be temporary and could be suitably minimised by the application of standard and appropriate mitigation measures	The effects from the Scheme in operation are likely to result in a significant improvement for human health (there are many receptors with significant medium/large improvements and short term AQS object exceedances are not expected). Changes to nitrogen deposition are expected at nine non-statutory designated sites. Following the precautionary principle, there is the potential for significant effects on 'designated habitats' within the nine non-statutory sites. This will be further assessed and presented within the ES
Cultural Heritage	Direct physical impacts are likely to occur as a result of site clearance and demolition, earthworks and landscaping, road construction, and the construction of proposed overbridges/structures Setting impacts, on designated heritage assets, are likely to occur due to the introduction of construction plant and machinery, increases in construction traffic, and the loss of screening vegetation	The setting of heritage assets could be impacted on, and these impacts could potentially be long term and permanent in nature. The change in traffic flow could reduce standing traffic, decreasing noise and air pollution and thus beneficial to setting, and the wider historic environment. Conversely the Scheme also has the potential to bring traffic into those areas not previously subject to a primary route resulting in significant negative impact.
Landscape and visual effects	The disruption and loss to important woodland blocks and field hedgerows, along with the introduction construction activities such as compound and storage areas, new night-time light sources, noise and movement of plant would be noticeable intrusive features for local receptors (e.g. users of PRoWs, residential properties and farm holdings)	The Scheme would impact upon the landscape through the loss of a number of existing landscape elements including the pastoral agricultural land, patchy hedgerows, and hedgerow trees. The Scheme, along with the associated traffic would also create a new noticeable feature resulting in a negative effect for some visual receptors.
Biodiversity	Potential effects include damage/ destruction of habitat and fragmentation of habitat. Also, there is potential for disturbance (i.e. noise, vibration, light and chemical pollution) and death/ injury of individuals from construction related hazards (such as entrapment in excavations, etc.). Works associated with the	Potential for polluted road run-off affecting the water environment and for impacts through traffic noise and road lighting.

Environmental Topic	Construction Combined effects	Operational Combined effects
	construction of the Scheme would also result in permanent loss and fragmentation of foraging habitat.	
Geology and Soils	Human receptors may be affected as a result of exposure to contaminated soil/ground gases and works associated with dust migration during earth The reuse of soils to ecological receptors or WFD receptors via elevated concentrations of potential contaminants of concern being moved to areas where more sensitive receptors are present Land will ned to be temporarily acquired as part however, this will be restored to its original condition Potential to impact on flood risk (positively in reducing groundwater flood risk and potentially other forms of flooding by increased storage capacity in the ground, or negatively depending on discharge arrangements but this would likely be covered off by the permitting).	Potential for polluted road run-off affecting the land and water environment. It is not possible to mitigate land acquired permanently for the Scheme however, consideration will be given as to how these soils may be re-used elsewhere on the Scheme. This might be for landscaping or grading embankments to maximise the area that can be returned to farming.
Noise and Vibration	There is potential for short-term adverse noise effects on receptors. Construction noise effects could occur due to the following aspects the operation of construction plant, the construction of the Mottram Underpass and from HGV movements to and from the site, for example site deliveries and the removal of spoil. There is also potential for short term vibration effects due to piling activities. Throughout the construction phase, levels of construction noise and vibration will vary greatly as a result of the transient nature of the works. Impacts at any one specific receptor are likely to be evident for a limited period as the works progress	Operational noise from the Scheme has the potential to impact upon receptors in the surrounding area. The nature of this effect will be dependent on the location of the receptor and its proximity to the new route, and the existing road network. Receptors close by to the existing route will likely experience beneficial impacts on noise due to traffic being moved further away however receptors closer to the new route may experience a slight increase in noise levels.
Population and human health	See construction combined effects for noise and vibration, geology and soils, air quality and landscape and visual effects	The combination of permanent land-take and severance on individual holdings is anticipated to result in significant effects. See operational effects for noise and vibration, geology and soils, air quality and landscape and visual effects

Environmental Topic	Construction Combined effects	Operational Combined effects
Road Drainage and the Water Environment	There is potential for polluted surface water runoff consisting of high sediment load, chemicals, and hydrocarbons from construction vehicles, plant and high-risk activities to enter the surface water features Construction activities have the potential to cause blockages within watercourses from works materials and / or increased sediment loads giving the potential for increased flooding.	The implementation of new crossings and extensions to existing crossings may result in a loss of open channel and water environment habitats. New cuttings, deep foundations and dewatering activities may affect groundwater levels and block, redirect or alter groundwater flow during construction and operation. There is also potential for polluted road run-off affecting the water environment.

Cumulative effects

15.3.2 Table 15-5 outlines the potential developments identified from Stage 2 which will be taken forward for further assessment at Stages 3 and 4 in the ES. These stages will identify the potential for any significant impacts as a result of cumulative effects.

15.3.3 This is not the definitive list of developments that will be assessed for the ES as it based on the list of 'Other Developments' produced at the time of this preliminary assessment. The list will be further developed and defined, in consultation with Local Planning Authorities, for the ES.

Table 15-5 key projects currently shortlisted for further consideration

Local Authority	Application Reference	Development Details	Development Status	Approx. Distance from the Scheme(m)	EIA required? (Y/N)
Tameside Metropolitan Borough Council	14/00903/OUT Outline planning permission 18/00015/REM | Approval of reserved matters Land bounded by Ashworth Lane and Chain Bar Lane	Comprehensive redevelopment for a new district centre comprising class A1 foodstore, retail units (Class A1-A5), Drive-Through Cafe/Restaurant (Class A3/A5) with associated means of access (All other matters reserved), including the demolition of existing buildings and structures.	February 2015: Grant of outline planning permission June 2018: Approval of reserved matters	877	N
High Peak Borough Council	HPK/2017/0325 Land North of Dinting Road, Glossop, Derbyshire	Residential development for up to 108 dwellings (access considered)	April 2018: Outline Planning Application - Approved	1765	N
High Peak Borough Council	HPK/2015/0412 Outline planning permission HPK/2017/0171: Approval of reserved matters Land at, Dinting Road, Glossop, Derbyshire	Residential development of up to 65 Houses, together with Associated Access	May 2016: Grant of planning permission Reserved matters awaiting decision	1765	N
High Peak Borough Council	HPK/2017/0198 Land at Woolley Bridge, East of A57, Hadfield, Glossop, Derbyshire, for	An indicative layout submitted with the application seeks to demonstrate that 31 No. dwellings can be accommodated within the site.	January 2019: Grant of outline planning permission	2134	N

Local Authority	Application Reference	Development Details	Development Status	Approx. Distance from the Scheme(m)	EIA required? (Y/N)
	residential development and associated workss				
Tameside Metropolitan Borough Council	06/00156/OUT and 11/00326/OUT Site of Hattersley High school and waterside court	Erection of 209 dwellings, following the approval of outline planning permission	June 2006: Outline planning permission approved August 2011: Extension of time limit for planning application 06/00156/OUT	2437	N
Tameside Metropolitan Borough Council	09/00760/OUT Hattersley Regeneration Sites 12 13 14 15 16 17 and 19	Development of approx. 192no. homes on Sites 12, 13, 14, 15, 16, 17, 19 & 20. Site 19 - 21no dwellings (09/12/2009). 06/00151/OUT Residential development: Site 19 - 14no. dwellings (17/03/06)	December 2009 Outline planning permission approved	2437	N
Tameside Metropolitan Borough Council	09/00759/OUT Land at Milverton avenue Hattersley regeneration site 11	Outline application (All matters reserved) for the residential development of 1.07 hectares of land. Residential development for approx. 55 no dwellings	Outline planning permission approved	2437	N

15.4 Summary

Combined effects

15.4.1 A high-level summary of anticipated effects has been provided for each of the environmental topics. Initial analysis has shown that some receptors have the potential to experience effects from the Scheme relating to multiple environmental assessment areas, though further assessment will be required to establish the extent of this.

15.4.2 For the ES, combined effects will be reported when this information is available from the individual topic assessments following their detailed assessments.

15.4.3 Many of the potential impacts will be minimised through a combination of best practice and mitigation measures. In some environmental assessment areas this is likely to sufficiently reduce impacts so that they are negligible or neutral in severity.

Cumulative effects

15.4.4 A full assessment of cumulative effects has not currently been undertaken, and therefore the full extent of cumulative effects is not currently known.

15.4.1 Furthermore, the cumulative effects assessment is based on the list of ‘Other Developments’ which is produced at the time of assessment, however, as new applications come forward and extant applications are ‘varied’ the list may become outdated.

15.4.2 A full assessment of cumulative effects will be undertaken, including updating the list of development projects listed in the cumulative effects assessment through discussions with Local Planning Authorities.

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17 Acronyms, Abbreviation and Descriptions

Table 17-1 Glossary of terms

Term	Description
Affected Road Network	The parts of the road network that would be affected by a change in traffic levels as the result of a transport scheme
Agricultural Land Classification	A framework for classifying land according to the extent to which its physical or chemical characteristics impose long term limitations on agricultural use. Agricultural land is classified into five categories according to versatility and suitability for growing crops. The top three grades, Grade 1, 2 and 3a, are referred to as 'Best and Most Versatile' land.
Air Quality Management Area	An area identified where the National Air Quality Objectives are not likely to be achieved. The Local Authority is required to produce a Local Air Quality Action Plan to plan how air quality in the area is to be improved
Air Quality Strategy	The Air Quality Strategy sets out air quality objectives and policy options to further improve air quality in the UK from today into the long term.
Annual Average Daily Traffic	The number of vehicles travelling on a particular stretch of road on an average day.
At grade	On the same level, for example, an at grade junction is two or more roads meeting or crossing on the same level.
Attenuation	The term used in drainage design to indicate a reduction in the rate of flow or flooding risk, for example, by means of a pond to hold back water
Aquifer	An underground rock formation containing water, often used as a water source
Best and Most Versatile	Defined as Grades 1, 2 and 3a of the Agricultural Land Classification as land which is most flexible, productive and efficient in response to inputs and which can best deliver future crops for food and non-food uses such as biomass, fibres and pharmaceuticals
Biodiversity Action Plan	An internationally recognized program addressing threatened species and habitats and is designed to protect and restore biological systems. The original impetus for these plans derives from the 1992 Convention on Biological Diversity.
British Geological Survey	A partly publicly-funded body which aims to advance geoscientific knowledge of the United Kingdom landmass and its continental shelf by means of systematic surveying, monitoring and research
Calculation of Road Traffic Noise	Method of calculating (and measuring) road traffic noise levels for new and altered highways.
Character	Is formed by elements of a heritage asset or landscape which contribute to its importance or value. Character can also refer to the overall appearance of a place or structure as perceived by those who visit and enjoy it – alteration to this appearance has the

Term	Description
	potential to detract from enjoyment of a heritage or landscape asset.
Conceptual Site Model	Serves to conceptualise the relationship between contaminant sources and receptors through consideration of potential or actual migration and exposure pathways
Conservation Area	An area of special environmental or historic interest or importance, of which the character or appearance is protected by law against undesirable changes (Section 69 of the Planning (Listed Buildings and Conservation Areas) Act 1990).
Cumulative impact	The combined residual impact of a proposed Scheme over the entirety of the Scheme, as opposed to residual impact for individual sections of the Scheme; also the combined impact with other schemes
Cutting	A section of road where the surrounding land is at a higher level and the ground has been dug away to put in the road.
DCO boundary	This boundary shows the limits within which works associated with the Scheme may be carried out, including both the temporary and permanent land -take which will be required for the construction and operation of the Scheme
Defra	Defra is the government department responsible for environmental protection, food production and standards, agriculture, fisheries and rural communities in the United Kingdom of Great Britain and Northern Ireland. Defra is a ministerial department, supported by 33 agencies and public bodies.
Department for Transport	Government department responsible for the transport network in England, and for aspects of the transport network in the devolved administrations.
Design Manual for Roads and Bridges	The Design Manual for Roads and Bridges (DMRB) contains information about current standards relating to the design, assessment and operation of motorway and all-purpose trunk roads in the United Kingdom.
Development Consent Order	The means of applying for consent to undertake a Nationally Significant Infrastructure Project (NSIP). NSIPs include, for example, major energy and transport projects.
Desk-based Assessment	A document produced to assess the overall heritage resources of a defined area. These are primarily performed without the aid of archaeological investigations through use of HERs and archive materials.
Disasters	A sudden accident or a natural catastrophe that causes great damage or loss of life
Do-Minimum	Future situation assuming no scheme is provided, but that maintenance is on-going
Do-Something	Future situation with the Scheme in place.
Early Assessment and Sifting Tool	A decision support tool that has been developed to quickly summarise and present evidence on options in a clear and consistent format. It provides decision makers with relevant, high

Term	Description
	level, information to help them form an early view of how options perform and compare. The tool itself does not make recommendations and is not intended to be used for making final funding decisions.
Earthworks	The process of excavating or increasing level of soil.
Ecological Zone of Influence	The area in which there may be ecological features subject to impacts and subsequent effects as a result of the Scheme, including those that would occur as a result of habitat loss, and those that would occur through disturbance, such as noise.
Environment Agency	A non-departmental public body with responsibilities relating to the protection and enhancement of the environment in England.
Environmental Management Plan	This document provides a framework to manage the environmental effects of projects to demonstrate compliance with environmental legislation, by providing a plan for the delivery of the project's design, mitigation, enhancement and monitoring commitments
Floodplain	Area of land prone to flooding and protected against development. The indicative floodplain is the flood risk area based on a 1 in 100 year storm.
Future reserve capacity	In terms of traffic modelling, traffic flows are modelled for the future (20 years beyond opening year) to establish if there is still capacity for traffic flow. Future reserve capacity means that in the future the junction will still have spare operating capacity.
Grade	In reference to designated assets: Many are classified to aid in assessing the level of protection they require based on their importance to the heritage or the county or an area. Assets are designated at Grades I (Highest), II* (High), II (Medium).
Habitats of Principal Importance	Under Section 41 of the Natural Environment and Rural Communities (NERC) Act, the Secretary of State is required to publish a list of habitats which are of principal importance for the conservation of biodiversity in England. Fifty-six habitats of principal importance are included on the S41 list. These are all the habitats in England that were identified as requiring action in the UK Biodiversity Action Plan and continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework.
HAWRAT	Water Risk Assessment Tool
Historic England	Publicly funded body that champions and protects England's historic places, including Stonehenge and Avebury; also known as the Historic Buildings and Monuments Commission for England.
Historic Environment Record (HER)	Information services that seek to provide access to comprehensive and dynamic resources relating to the historic environment of a defined geographic area for public benefit and use
Local Nature Reserve	A statutory designation made under Section 21 of the National Parks and Access to the Countryside Act 1949, and amended by Schedule 11 of the Natural Environment and Rural Communities

Term	Description
	Act 2006, by principal local authorities. A Local Nature Reserve must be of importance for wildlife, geology, education or public enjoyment.
LiDAR	LiDAR (light detection and ranging), also known as Airborne Laser Altimetry, is used to produce accurate horizontal and vertical evaluation measurements. This data has considerable potential for archaeological investigation such as mapping sites with raised earthworks and understanding the site within the wider area
Listed Building	Building or structure listed by the Secretary of State as being of 'special architectural or historic interest'
Limit Values	Refers to airborne concentrations of chemical substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed, day after day, over a working lifetime, without adverse health effects.
Mineral Safeguarding Area	An area designated by Minerals Planning Authorities which covers known deposits of minerals which are desired to be kept safeguarded from unnecessary sterilisation by non-mineral development
Ministry of Agriculture, Fisheries and Food	A UK government department created by the Board of Agriculture Act 1889. The Ministry was dissolved in 2002, at which point its responsibilities were merged into the Department for Environment, Food and Rural Affairs (Defra).
Motorised Travellers	A person who travels by a motorised vehicle which is a vehicle that is fitted with an engine or a motor e.g. mobility scooter.
Multi-Agency Geographic Information for the Countryside	A web-based interactive map to bring together information on key environmental schemes and designations in one place. Multi-Agency Geographic Information for the Countryside (MAGIC) is a partnership project involving six government organisations who have responsibilities for rural policy-making and management
National Character Area	The subdivision of England into 159 distinct natural areas. Each area is defined by a unique combination of landscape, biodiversity, geodiversity, history, and cultural and economic activity. Their boundaries follow natural lines in the landscape rather than administrative boundaries.
National Nature Reserve	Reserves established to protect some of the most important habitats, species and geology in the United Kingdom, and to provide 'outdoor laboratories' for research. There are currently 224 NNRs in England with a total area of over 94,400 hectares - approximately 0.7% of the country's land surface. Natural England manages about two thirds of England's NNRs. The remaining reserves are managed by organisations approved by Natural England, for example, the National Trust, Forestry Commission, RSPB, Wildlife Trusts and local authorities.
National Vegetation Classification	The National Vegetation Classification was commissioned in 1975 by the Nature Conservancy Council (NCC) to provide a comprehensive and systematic catalogue and description of the plant communities of Britain. It has now been accepted as a standard, not only by the nature conservation and countryside organisations, but also by forestry, agriculture and water

Term	Description
	agencies, local authorities, nongovernmental organisations, major industries and universities.
Nationally Significant Infrastructure Project	A project of a type and scale defined under the Planning Act 2008 and by order of the Secretary of State relating to energy, transport, water, waste water and waste generally. These projects require a single development consent. Planning permission, listed building consent and scheduled monument consent amongst others are not required for Nationally Significant Infrastructure Projects.
Natural England	Executive non-departmental public body responsible for the natural environment.
Non-Motorised User	Cyclists, pedestrians (including wheelchair users), and horse-riders using the public highway.
Noise Important Area	Areas where the 1% of the population that are affected by the highest noise levels from major roads are located according to the results of Defra's strategic noise maps
Pollution Climate Mapping	A collection of models designed to fulfil part of the United Kingdom's EU Directive (2008/50/EC) on ambient air quality and cleaner air for Europe, requirements to report on the concentrations of particular pollutants in the atmosphere. There is one model per pollutant, each with two parts: a base year model and a projections model. The Pollution Climate Mapping model provides outputs on a 1x1 km grid of background conditions plus around 9,000 representative road side values. The Mapping is also used for scenario assessment and population exposure calculations to assist policy developments and provides model runs to support the writing of Time Extension Notification applications for PM10 and NOx.
Project Control Framework	A joint Department for Transport and Highways England approach to managing major projects. The Framework comprises a standard project lifecycle; standard project deliverables; project control processes and governance arrangements
Preliminary Sources Study Report (PSSR)	Technical report on geology and ground conditions
Public Right of Way	A way over which the public have a right to pass and repass. The route may be used on foot, on (or leading) a horse, on a pedal cycle or with a motor vehicle, depending on its status. Although the land may be owned by a private individual, the public may still gain access across that land along a specific route. Public rights of way are all highways in law.
Record of Environmental Actions and Commitments	Mechanism for identifying the environmental commitments that are recommended in the ES (and in accordance with the factors outlined in DMRB LA 104 and DMRB 120), to address the potential environmental effects of the Scheme.
Receptor	Environmental feature that has the potential to be adversely or beneficially affected by an impact of the proposed scheme, e.g., local residents, wildlife and water bodies

Term	Description
Road Investment Strategy	The long-term strategy to improve England's motorways and major A roads. The first RIS (known as RIS1) was published in 2014 and covers the period 2015-2020. A second RIS (RIS2) was published in 2015, and covers the post-2020 period.
Scheduled monument	A 'nationally important' archaeological site or historic building, given protection against unauthorised change and included in the Schedule of Monuments kept by the Secretary of State for Culture, Media and Sport. The protection given to scheduled monuments is given under the Ancient Monuments and Archaeological Areas Act 1979
The Scheme	The A57 Link Roads Scheme
Sites of Nature Conservation Importance	Locally important sites of nature conservation adopted by local authorities for planning purposes.
Site of Special Scientific Interest	A conservation designation denoting to a protected area in the United Kingdom. The Sites are protected by law to conserve their wildlife or geology.
Site Waste Management Plan	A Site Waste Management Plan should describe how materials will be managed efficiently and disposed of legally during the construction of the works, explaining how the re-use and recycling of materials will be maximised. This involves estimating how much of each type of waste is likely to be produced and the proportion of this that will be re-used or recycled on site, or removed from the construction site for re-use, recycling, recovery or disposal. It is the joint responsibility of the client and the principal contractor to ensure that a Site Waste Management Plan is in place before construction begins and to ensure that it is enforced
Source Protection Zone	Areas of land around over 2000 groundwater sources such as wells, boreholes and springs used for public drinking water supply. The zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. There are three main zones (inner, outer and total catchment) and a fourth zone of special interest, which is occasionally applied to a groundwater source. The zones are used in conjunction with the Groundwater Protection Policy to set up pollution prevention measures in areas which are at a higher risk, and to monitor the activities of potential polluters nearby.
Special Area of Conservation	Areas of strictly protected sites designated under the EC Habitats Directive (92/43/EEC) on the conservation of natural habitats and of wild fauna and flora. The listed habitat types and species are those considered to be most in need of conservation at a European level (excluding birds).
Special Protection Area	Areas of strictly protected sites classified in accordance with Article 4 of the EC Birds Directive (2009/147/EC) on the conservation of wild birds. They are classified for rare and vulnerable birds (as listed on Annex I of the Directive), and for regularly occurring migratory species.
Study Area	The spatial area within which environmental effects are assessed i.e. extending a distance from the project footprint in which

Term	Description
	significant environmental effects could occur (this may vary between the topic areas)
Transport Analysis Guidance	Guidance produced by DfT on the process of appraisal of transport interventions.
Tree Preservation Order	A Tree Preservation Order is made by a Local Planning Authority to protect specific trees or a particular area, group or woodland from deliberate damage and destruction. TPOs can prevent the felling, lopping, topping, uprooting or otherwise wilful damaging of trees without the permission of the Local Planning Authority.
Unexploded Ordnance	An explosive weapon (bombs, shells, grenades, land mines, naval mines, cluster munition, etc.) that did not explode when they were employed and still pose a risk of detonation, sometimes many decades after they were used or discarded.
Vulnerability	The quality or state of being exposed to the possibility of being attacked or harmed, either physically or emotionally
Water Framework Directive	The Water Framework Directive (2000/60/EC) is a EU directive which aims to achieve good status of all water bodies (surface waters, groundwaters and the sites that depend on them, estuaries and nearshore coastal waters) and the prevent any deterioration. It has introduced a comprehensive river basin management planning system to protect and improve the ecological quality of the water environment. It is underpinned by the use of environmental standards.
World Heritage Site	A site listed by UNESCO because of its special natural or cultural value
Zone of Theoretical Visibility	A map, usually digitally produced, showing areas of land within which a development is theoretically visible.

Table 17-2 Acronyms and Abbreviation

Acronyms and Abbreviations	Description
ºC	Degrees Celsius
AADT	Annual Average Daily Traffic
ADS	Archaeological Data Service
ALC	Agricultural Land Classification
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
ARN	Affected Road Network
BAP	Biodiversity Action Plan

Acronyms and Abbreviations	Description
BGS	British Geological Survey
BMV	Best and Most Versatile
BNL	Basic noise level
CAZ	Clean Air Zone
CD&E	Construction, Demolition and Excavation
CEA	Cumulative Effects Assessment
CL:AIRE	Contaminated Land: Applications in Real Environments
CMS	Continuous Monitoring Stations
CO2	Carbon Dioxide
CRTN	Calculation of Road Traffic Noise
CSM	Conceptual Site Model
dB	Decibel
DBA	Desk-based Assessment
DBRC	Derbyshire Biological Records Centre
DCLG	Department for Communities and Local Government
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DM	Do-Minimum
DMRB	Design Manual for Roads and Bridges
DS	Do-Something
EA	Environment Agency
EAR	Environmental Assessment Report
EAST	Early Assessment and Sifting Tool
EEA	European Economic Area
EGLs	Existing Ground Levels

Acronyms and Abbreviations	Description
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESR	Environmental Scoping Report
EqIA	Equalities Impact Assessment
EZoI	Ecological Zone of Influence
FCD	Field Capacity Days
FRA	Flood Risk Assessment
GCN	Great Crested Newt
GHG	Greenhouse gas
GI	Ground Investigation
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GMAAS	Greater Manchester Archaeological Advisory Service
GMCA	Greater Manchester Combined Authority
GMLRC	Greater Manchester Local Record Centre
GMMC	Greater Manchester, Merseyside and Cheshire
GMRC	Greater Manchester Records Centre
GMSF	Greater Manchester Spatial Framework
HEWRAT	Highways England Water Risk Assessment Tool
HDV	Heavy Duty Vehicle/Heavy Delivery Vehicle
HE	Highways England
HER	Historic Environment Record
HGV	Heavy Goods Vehicle
HIA	Health Impact Assessment
HLC	Historic Landscape Character
HRA	Habitats Regulation Assessment
IMD	Index of Multiple Deprivation

Acronyms and Abbreviations	Description
JNCC	Joint Nature Conservation Committee
Kg/ha/year	Kilograms per hectare per year
LAQM.TG	Local Air Quality Management Technical Guidance
LCRM	Land Contamination Risk Management
LLFA	Lead Local Flood Authorities
LOAEL	Lowest Observed Adverse Effect Level
LNR	Local Nature Reserve
LSOA	Lower Super Output Areas
LWS	Local Wildlife Site
MAFF	Ministry of Agriculture, Fisheries and Food
MAGIC	Multi-Agency Geographic Information for the Countryside
MoRPH	Modular River Physical
NERC	Natural Environmental and Rural Communities
NHLE	National Heritage List for England
NPPG	National Planning Practice Guidance
NPSE	Noise Policy Statement for England
NCA	National Character Area
NCNR	National Cycle Network Route
NE	Natural England
NIA	Noise Important Area
NML	Noise Monitoring Locations
NMU	Non-Motorised User
NN NPS	National Networks National Policy Statement
NNR	National Nature Reserves
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxide

Acronyms and Abbreviations	Description
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPSE	Noise Policy Statement for England
NPSNN	National Policy Statement for National Networks
NSIP	Nationally Significant Infrastructure Project
NVC	National Vegetation Classification
OS	Ordnance Survey
PAH	Poly Aromatic Hydrocarbons
PCF	Project Control Framework
PCL	Potential Contaminant Linkages
PCM	Pollution Climate Mapping
PCSM	Preliminary Conceptual Site Model
PDNP	Peak District National Park
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
PM10	Particulate Matter with a diameter of 10 micrometres or less
PPE	Personal Protective Equipment
PPG	Planning Practice Guidance
PRoW	Public Right of Way
PSSR	Preliminary Sources Study Report
RBD	River Basin District
RBMP	River Basin Management Plan
REAC	Record of Environmental Actions and Commitments
RIGS	Regionally Important Geology Sites
RIS	Road Investment Strategy

Acronyms and Abbreviations	Description
SAC	Special Areas of Conservation
SNCI	Sites of Nature Conservation Importance
SLCA	Scheme Level Character Area
SOAEL	Significant Observed Adverse Effect Level
SoS	Secretary of State
SPA	Special Protection Areas
SPI	Species of Principal Importance
SPZ	Source Protection Zone
SoCC	Statement of Community Consultation
SSSI	Site of Special Scientific Interest
SuDs	Sustainable Drainage Systems
SWMP	Site Waste Management Plan
TAG	Transport Analysis Guidance
TCA	Town Character Area
TfGM	Transport for Greater Manchester
TPO	Tree Preservation Order
UXO	Unexploded Ordnance
WC	Wetness Class
WCH	Walkers, Cyclists and Horse-riders
WFD	Water Framework Directive
WHO	World Health Organisation
ZOI	Zone of Influence

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