HS2

October 2018

# High Speed Rail (Crewe to Manchester and West Midlands to Leeds)

## Working Draft Environmental Statement

## Volume 2: Community Area report

## LA09: Stonebroom to Clay Cross

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## LA09: Stonebroom to Clay Cross

Department for Transport

High Speed Two (HS2) Limited has been tasked by the Department for Transport (DfT) with managing the delivery of a new national high speed rail network. It is a non-departmental public body wholly owned by the DfT.

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# Preface

## The working draft Environmental Statement

This report forms part of Volume 2 of the working draft Environmental Statement (ES) for Phase 2b of High Speed Two (HS2). The purpose of the working draft ES is to provide the public and other stakeholders with an opportunity to review and comment on preliminary environmental information for Phase 2b of HS2, which is based on a stage in the ongoing design development and environmental assessment process. Nothing included at this stage is intended to limit the form of the final scheme that will be presented in the hybrid Bill and formal ES in light of further scheme development and the ongoing discussions with stakeholders such as Transport for the North and Midlands Connect. Consultation on the working draft ES is being undertaken to help inform the ongoing design and environmental assessment in advance of producing a statutory formal ES. The formal ES will accompany the deposit of the hybrid Bill for Phase 2b of HS2.

Phase 2b comprises the section of the proposed HS2 rail network, from Crewe to Manchester (and a connection onto the West Coast Main Line (WCML)) (the western leg), and from the West Midlands to Leeds (and a connection onto, and part electrification of, the Midland Main Line (MML) and a connection onto the East Coast Main Line (ECML)) via the East Midlands and South Yorkshire (the eastern leg). Collectively, this is referred to in this working draft ES as the 'Proposed Scheme'. The working draft ES describes the Proposed Scheme and reports its likely significant environmental effects and the measures proposed to mitigate those effects, based on a stage in the ongoing design and environmental assessment.

The hybrid Bill for Phase One of the HS2 network, between London and the West Midlands, was the subject of an ES deposited in November 2013, followed by ESs deposited with Additional Provisions to that Bill in 2014 and 2015. The Phase One hybrid Bill received Royal Assent in February 2017 and pre-construction work on Phase One commenced in July 2017.

The hybrid Bill for Phase 2a of the HS2 network, between the West Midlands and Crewe, was the subject of an ES deposited in July 2017, followed by a subsequent ES deposited with an Additional Provision to that Bill in March 2018. The Phase 2a Bill is expected to receive Royal Assent in 2019.

## Consultation on the working draft Environmental Statement

The public has an opportunity to comment on this working draft ES. The period of public consultation is taking place during October 2018 – December 2018; the first day of the consultation period being the date the Secretary of State for Transport formally announces the consultation and the publication of the working draft ES documents on www.gov.uk/hs2.

# Structure of the HS2 Phase 2b working draft Environmental Statement

This report forms part of Volume 2 of the working draft ES for Phase 2b of HS2. The working draft ES describes the design of the Proposed Scheme and reports the likely significant environmental effects of the construction and operation of the Proposed Scheme and proposed mitigation and monitoring measures, based on a stage in the ongoing design and environmental assessment process. The report will be updated for the formal ES to reflect further work on the design, assessment and mitigation and monitoring measures between now and when the hybrid Bill is deposited. The structure of the working draft ES is shown Figure 1.

This working draft ES has been prepared by persons who have sufficient expertise to ensure the completeness and technical quality of the statement.

The working draft ES comprises the following documents:

## Non-technical summary

This provides a summary in non-technical language of the following, identified at a stage in the ongoing design and environmental assessment:

- the Proposed Scheme and the reasonable alternatives studied;
- the likely significant beneficial and adverse effects of the Proposed Scheme;
- the means to avoid or reduce likely significant environmental effects; and
- an outline of the monitoring measures to manage the effects of construction and the effectiveness of mitigation post construction, as well as appropriate monitoring during operation.

## Glossary of terms and list of abbreviations

This contains terms and abbreviations, including units of measurement, used throughout the working draft ES.

## Volume 1: Introduction and methodology

This provides:

- a description of HS2, the environmental impact assessment (EIA) process and the approach to consultation and engagement;
- details of the permanent features of the Proposed Scheme and general construction techniques, based on a stage in the ongoing design;
- a summary of the scope and methodology for the environmental topics;
- an outline of the general approach to mitigation;
- an outline of the approach to monitoring, including measures to manage the effects of construction, the effectiveness of mitigation post construction, as well as the approach to monitoring during the operational phase, based on a stage in the ongoing design; and

- a summary of the reasonable alternatives studied (including local alternatives studied prior to the Government's announcement of the preferred route in July 2017). Local alternatives studied post July 2017 are reported in the relevant Volume 2: Community area reports.

## Volume 2: Community area reports and map books

These cover the following community areas:

- western leg: MA01 Hough to Walley's Green; MA02 Wimboldsley to Lostock Gralam; MA03 Pickmere to Agden and Hulseheath; MA04 Broomedge to Glazebrook; MA05 Risley to Bamfurlong; MA06 Hulseheath to Manchester Airport; MA07 Davenport Green to Ardwick; MA08 Manchester Piccadilly Station; and
- eastern leg: LA01 Lea Marston to Tamworth; LA02 Birchmoor to Austrey; LA03 Appleby Parva to Ashby-de-la-Zouch; LA04 Coleorton to Kegworth; LA05 Ratcliffe-on-Soar to Long Eaton; LA06 Stapleford to Nuthall; LA07 Hucknall to Selston; LA08 Pinxton to Newton and Huthwaite; LA09 Stonebroom to Clay Cross; LA10 Tibshelf to Shuttlewood; LA11 Staveley to Aston; LA12 Ulley to Bramley; LA13 Ravenfield to Clayton; LA14 South Kirkby to Sharlston Common; LA15 Warmfield to Swillington and Woodlesford; LA16 Garforth and Church Fenton; LA17 Stourton to Hunslet; and LA18 Leeds Station.

The reports provide the following information for each area, as identified at a stage in the ongoing design and environmental assessment:

- an overview of the area;
- a description of the construction and operation of the Proposed Scheme within the area;
- a summary of the local alternatives considered since the Government's announcement of the preferred route in July 2017;
- a description of the environmental baseline;
- a description of the likely significant beneficial and adverse effects of the Proposed Scheme;
- the proposed means of avoiding, reducing or managing the likely significant adverse effects; and
- where possible, the proposals for monitoring, including measures during and post construction, and during the operational phase.

The maps relevant to each community area are provided in a separate Volume 2: Community area map book. These maps include the location of the key environmental features (Map Series CT-10), key construction features (Map Series CT-05) and operation features (Map Series CT-06) of the Proposed Scheme. There are also specific maps showing proposed viewpoint and photomontage locations (Map Series LV-00, LV-02, LV-03, and LV-04, to be read in conjunction with Section 11, Landscape and visual of the Volume 2: Community area reports), operational sound contour maps (Map Series SV-01, to be read in conjunction with Section 13, Sound, noise and vibration of the Volume 2: Community area reports) and maps showing key surface water and groundwater features (Map Series WR-01 and WR-02, to be read in conjunction with Section 15, Water resources and flood risk of the Volume 2: Community area reports).

In addition to the community areas detailed above, reports are provided for community areas within which electrification of a section of the MML is proposed: MML01 Danesmoor to Brierley Bridge and MML02 Unstone Green to Sheffield Station. These reports are provided at an earlier stage of the design and environmental assessment process, following the amendment of the route of the Proposed Scheme to include the electrification of a section of the MML between Clay Cross and Sheffield Midland Station. This would enable high speed trains to connect to Chesterfield and Sheffield as part of the Proposed Scheme. They include for each area:

- an overview of the area;
- a description of the proposed works within the area, based on a stage in the ongoing design;
- an outline of potential effects; and
- an overview of stakeholder engagement and consultation to be carried out as part of the EIA process.

Mitigation measures have not been identified at this stage of the design and environmental assessment process in relation to the likely effects arising from construction and operation of the Proposed Scheme for the MML01 Danesmoor to Brierley Bridge and MML02 Unstone Green to Sheffield Station areas. Any required mitigation measures will be reported in the formal ES. In addition, any required environmental monitoring during operation of the Proposed Scheme will be reported in the formal ES.

## Volume 3: Route-wide effects

This describes the effects that are likely to occur at a geographical scale greater than the community areas described in the Volume 2: Community area reports, based on a stage in the ongoing design and environmental assessment.

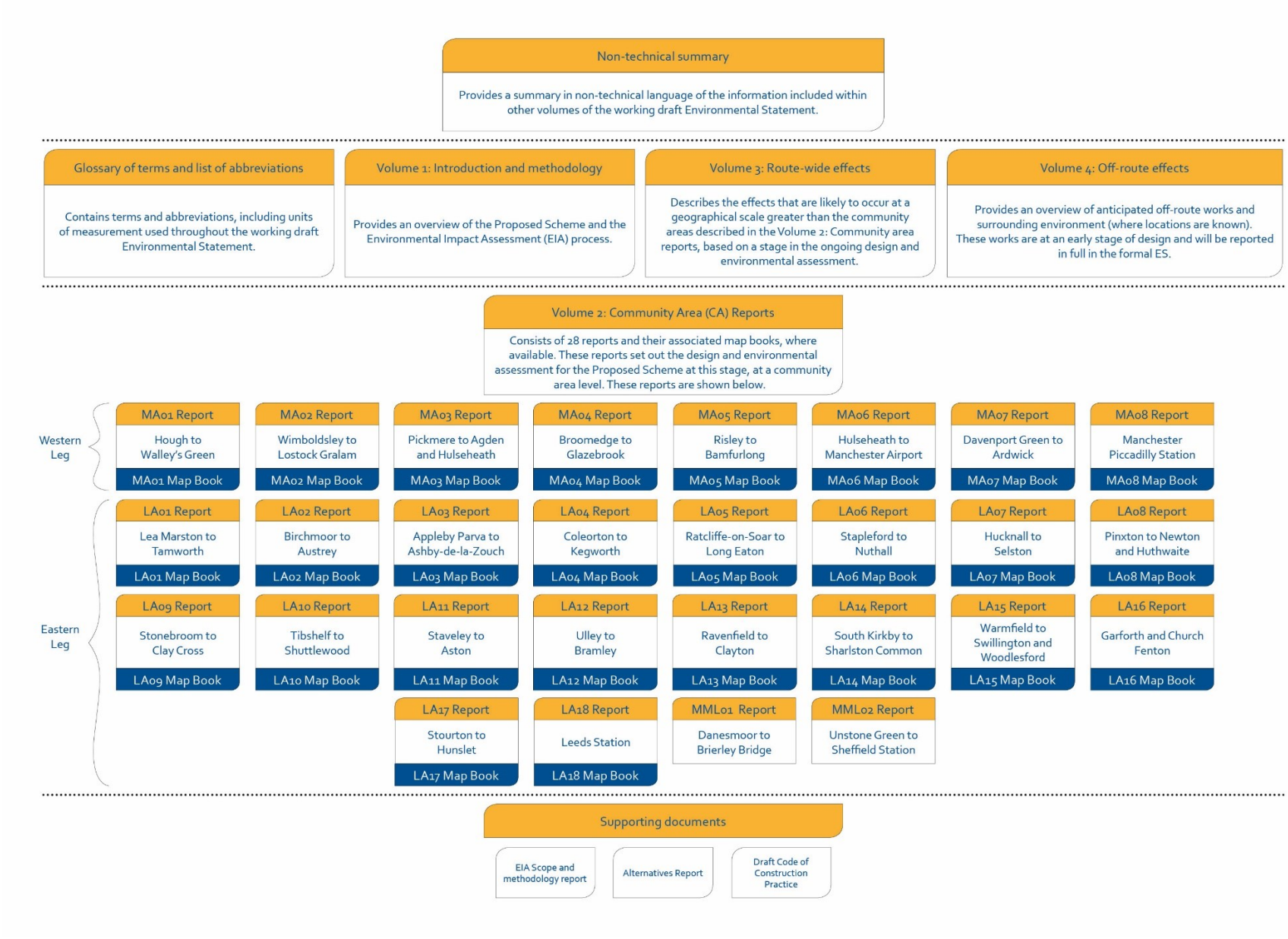
## Volume 4: Off-route effects

This provides an overview of anticipated off-route works and surrounding environment (where locations are known). These works are at an early stage of design and will be reported in full in the formal ES.

## Supporting documents

- EIA Scope and Methodology Report: this outlines the scope and methodology adopted for the EIA. HS2 Ltd consulted on a draft of the EIA Scope and Methodology Report (SMR) between July and September 2017. This updated version takes into consideration comments received, where appropriate, in addition to changes required as a result of updates to legislation or industry best practice guidance.
- Alternatives report: this describes the evolution of the Proposed Scheme and the reasonable alternatives considered at this stage of the design, at the strategic, route-wide, route corridor and local levels.
- Draft Code of Construction Practice (CoCP): this sets out measures and standards to provide effective planning, management and control of potential impacts on individuals, communities and the environment during construction.

Figure 1: Structure of the working draft Environmental Statement



# 1 Introduction

## 1.1 Introduction to HS2

1.1.1 High Speed Two (HS2) is a new high speed railway proposed by the Government to connect major cities in Britain. Stations in London, Birmingham, Leeds, Manchester, East Midlands and South Yorkshire will be served by high speed trains running at speeds of up to 360 kilometres per hour (kph) (225 miles per hour (mph)).

1.1.2 HS2 will be built in phases. Phase One comprises the first section of the HS2 network of approximately 230km (143 miles) between London and the West Midlands that will commence operations in 2026. It was the subject of an Environmental Statement (ES) deposited with the High Speed Rail (London - West Midlands) Bill in November 2013. Subsequent ESs were deposited with Additional Provisions to that Bill in 2014 and 2015. The High Speed Rail (London - West Midlands) Bill received Royal Assent in February 2017 and initial construction works on Phase One have commenced.

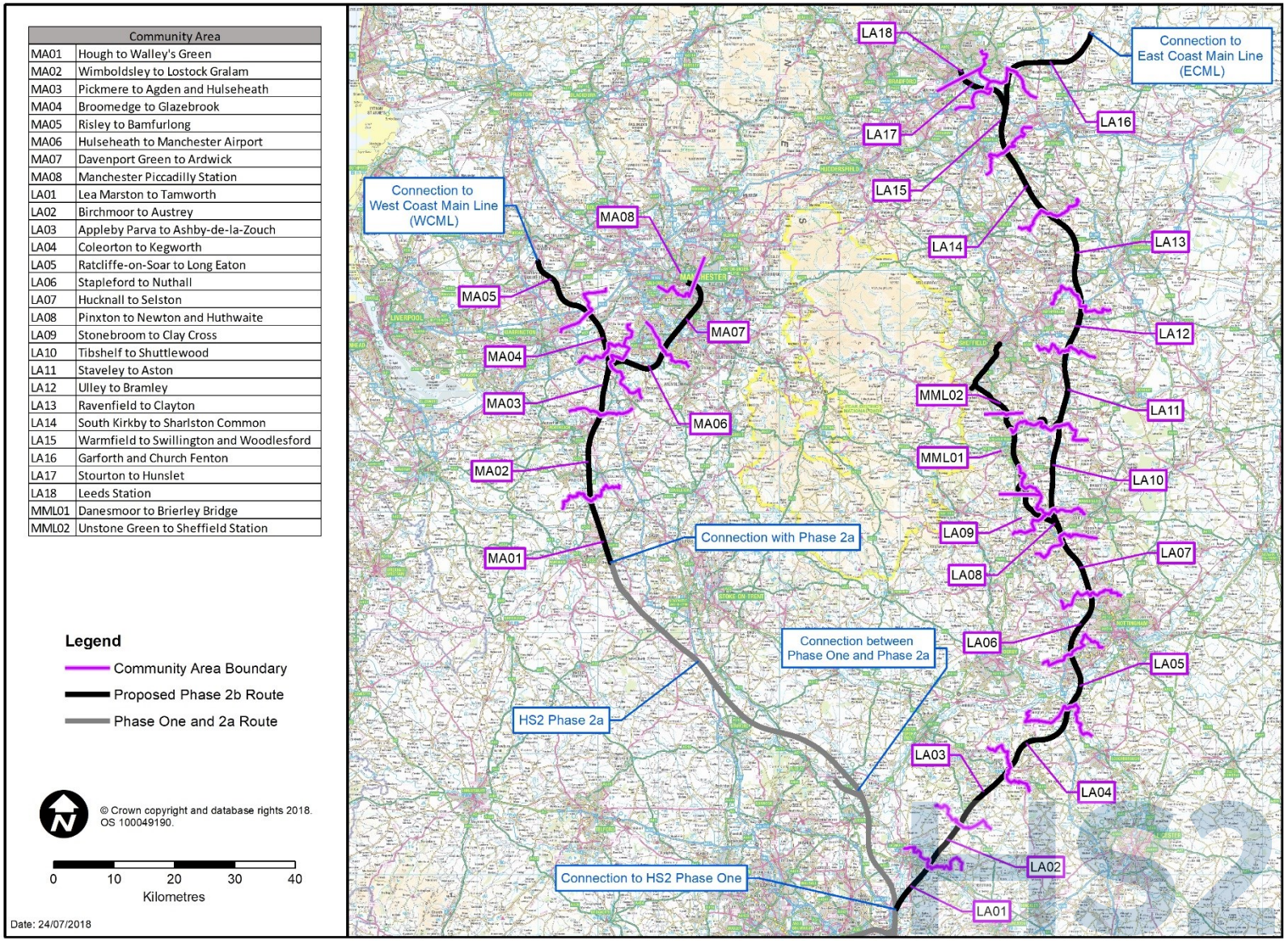
1.1.3 Phase Two of HS2 will extend the route from Phase One in the West Midlands to the north-west to Manchester (approximately 80km (50 miles) with connections to the West Coast Main Line (WCML) at Crewe and Golborne, and to the north-east to Leeds with a connection to the Erewash Valley Line and Midland Main Line (MML) south-east of Chesterfield and the East Coast Main Line (ECML) approaching York (approximately 198 km (123 miles)), completing what is known as the 'Y network'.

1.1.4 Phase Two of HS2 is being taken forward in two stages, referred to as Phase 2a and Phase 2b. Phase 2a of HS2 includes the section of the route between the West Midlands and Crewe. The High Speed Rail (West Midlands - Crewe) Bill, together with an ES, was prepared for the Phase 2a proposals and deposited in Parliament in July 2017. A subsequent ES was deposited with Additional Provisions to that Bill in March 2018.

1.1.5 Phase 2b (the Proposed Scheme), the subject of this working draft ES, comprises the route from Crewe to Manchester (and connections into the WCML) (referred to as the 'western leg'), and from the West Midlands to Leeds (and connections into the Midland Main Line (MML and the ECML)) via the East Midlands and South Yorkshire (referred to as 'the eastern leg'). The connection to and electrification of an approximately 30km (19 miles) section of the existing MML would enable high speed trains to connect to Chesterfield and Sheffield. Construction of the Proposed Scheme would commence in 2023, with operation planned to start in 2033.

1.1.6 For environmental assessment and community engagement purposes, the Proposed Scheme has been divided into 28 community areas (CA). These are shown in Figure 2. This CA report relates to the Stonebroom to Clay Cross area (CA number LA09) which is located on the eastern leg of the Proposed Scheme.

Figure 2: The HS2 Phase 2b route and community areas



## 1.2 Purpose of this report

1.2.1 This working draft ES sets out the current design of the Proposed Scheme, the current environmental baseline information, and describes the likely impacts (and where practicable, the significant effects) of the construction and operation of the Proposed Scheme on the environment within the Stonebroom to Clay Cross area. The report also describes the proposed mitigation measures that have been identified, at this stage, to avoid, reduce or manage the likely significant adverse effects of the Proposed Scheme on the environment within the area, along with proposed monitoring measures.

1.2.2 Consultation on the working draft ES is being carried out early in the development of the Phase 2b proposals. This is to assist the early engagement with those potentially affected by the Proposed Scheme and to help inform the design and assessment of the Proposed Scheme. Parliamentary Standing Orders do not require a working draft ES. Developing a working draft ES and consulting on it in advance of the statutory formal ES means that consultees have the opportunity to comment on the Proposed Scheme earlier in the process.

1.2.3 As this is a working draft ES, where information is not available at this time, professional judgement and reasonable worst-case assumptions have been used to provide an indication of the likely impact to inform the consultation.

1.2.4 The likely significant environmental effects of the Proposed Scheme will be described in the formal ES to be deposited in accordance with the requirements of Parliamentary Standing Order 27A (SO27A)[1,2]. It is possible that the effects and mitigation described in the formal ES may differ from those presented in this working draft ES, due to the provisional nature of the environmental and design information that is currently available and as a result of consultation on the Proposed Scheme, as appropriate.

1.2.5 The working draft ES has been undertaken on the assumption that the policies adopted for Phase One and Phase 2a will also apply to Phase 2b. The assessment also assumes that any general mitigation measures required as a result of those policies are implemented appropriately in the delivery and operation of the Proposed Scheme. Where policies are referred to in this working draft ES it is on this basis.

## 1.3 Structure of this report

1.3.1 This report is divided into the following sections:

- Section 1: an introduction to HS2 and the purpose and structure of this report;
- Section 2: overview of the community area, description of the Proposed Scheme within the community area and its construction and operation, and a description of the local alternatives considered;

[1] *Standing Order 27A of the Standing Orders of the House of Commons relating to private business (environmental assessment)*, House of Commons
[2] House of Lords, 2005, Standing Orders of the House of Lords - Private Business, The Stationery Office

- Section 3: consultation and stakeholder engagement; and
- Sections 4 to 15: an assessment of the following environmental topics:
  - agriculture, forestry and soils (Section 4);
  - air quality (Section 5);
  - community (Section 6);
  - ecology (Section 7);
  - health (Section 8);
  - historic environment (Section 9);
  - land quality (Section 10);
  - landscape and visual (Section 11);
  - socio-economics (Section 12);
  - sound, noise and vibration (Section 13);
  - traffic and transport (Section 14); and
  - water resources and flood risk (Section 15).

1.3.2 Each environmental topic section comprises:

- an introduction to the topic;
- a description of the existing environmental baseline within the community area;
- a description of the impacts or likely significant environmental effects identified to date arising during construction and operation of the Proposed Scheme; and
- a description of any proposed mitigation and monitoring measures that have been identified to date to address any significant adverse effects.

1.3.3 Environmental effects have been assessed in accordance with the methodology set out in Volume 1 and the EIA Scope and Methodology Report (SMR)[3].

1.3.4 The maps relevant to the Stonebroom to Clay Cross area are provided in a separate corresponding document entitled Volume 2: LA09 Map Book, which should be read in conjunction with this report.

1.3.5 The Proposed Scheme described in this report is that shown on the Map Series CT-05 (construction) and CT-06 (operation) (Volume 2: LA09 Map Book). There is some

[3] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

flexibility during detailed design to alter the horizontal and vertical alignments and other details within the limits shown on the plans and sections submitted to Parliament and as set out in the Bill, and this flexibility is included within the scope of the environmental assessment. Further explanation is provided in Volume 1, Section 1.

1.3.6 In addition to the environmental topics covered in Sections 4 to 15 of this report, electromagnetic interference is addressed in Volume 1 and climate change, major accidents and natural disasters, and waste and material resources are addressed in Volume 3 on a route-wide basis.

# 2 Overview of the area and description of the Proposed Scheme

## 2.1 Overview of the area

### General

2.1.1 The Proposed Scheme in the Stonebroom to Clay Cross area (LA09) would be approximately 5.2km in length, passing through the parishes of Newton, Tibshelf, Morton and Pilsley within the local authority areas of Bolsover District Council (BDC) and North East Derbyshire District Council (NEDDC), which both lie within the Derbyshire County Council (DCC) area.

2.1.2 The Proposed Scheme in the Stonebroom to Clay Cross area would comprise a continuation of the Sheffield Southern spur, which would diverge from the eastern leg of the Proposed Scheme main line in the Pinxton to Newton and Huthwaite area (LA08).

2.1.3 As shown in Figure 3, the Pinxton to Newton and Huthwaite area (LA08) lies to the south-east, and the Tibshelf to Shuttlewood area (LA10) lies to the north-east of the Stonebroom to Clay Cross area.

### Settlement, land use and topography

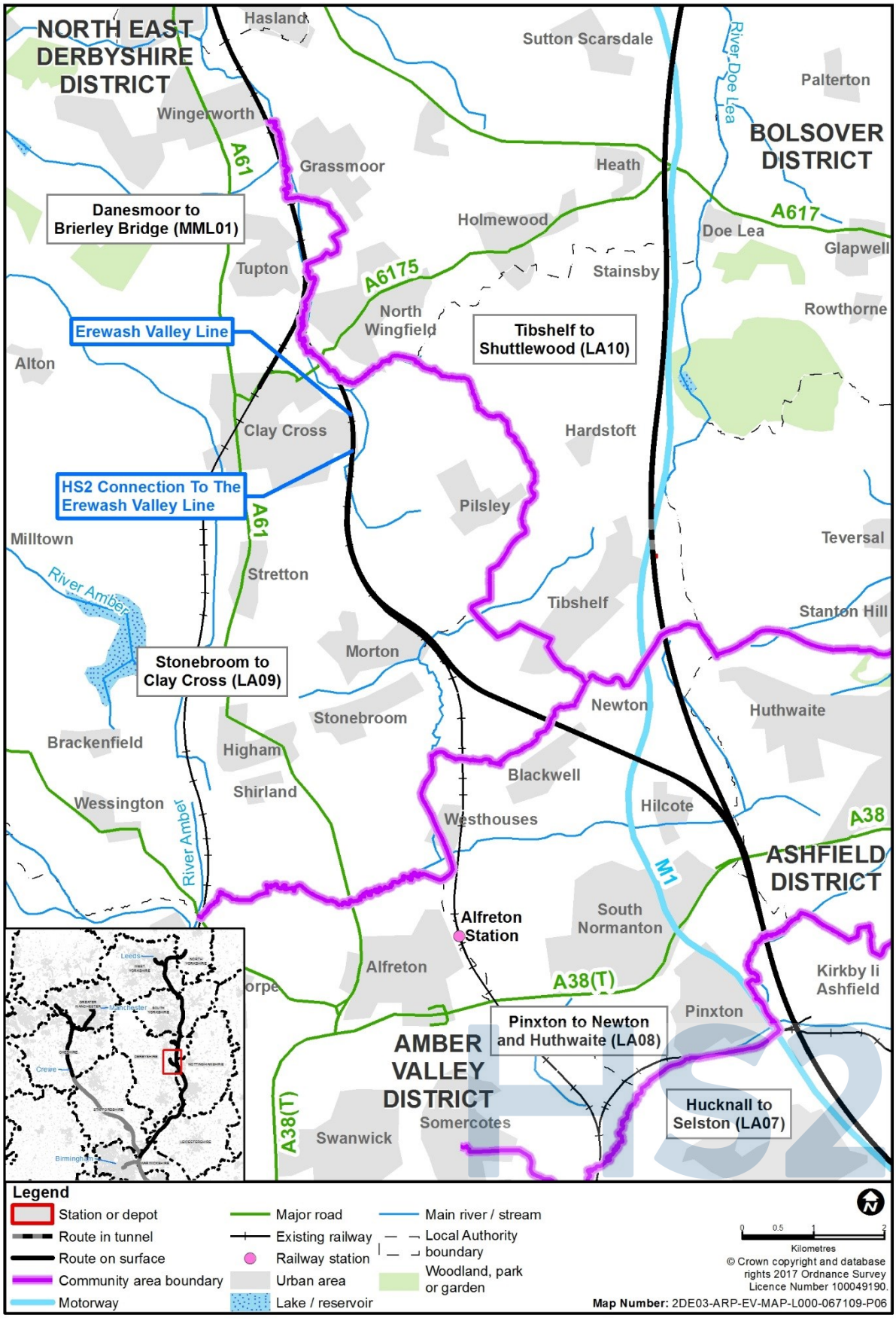
2.1.4 The Stonebroom to Clay Cross area is predominantly semi-rural in character, with agriculture being the main land use. This is interspersed with woodland, including Padley Wood Ancient Woodland close to the Proposed Scheme. There are a range of commercial land uses, as well as areas of former industrial areas, including significant areas that have been restored to agriculture from former open cast coal mines.

2.1.5 The villages of Stonebroom, Morton and Clay Cross lie mostly to the west of the Erewash Valley Line. The village of Pilsley lies further to the north-east. There are also scattered individual properties that lie close to Morton and between Pilsley and the Erewash Valley Line.

2.1.6 The topography of the area comprises mainly gently undulating lowland landscapes, with a high point of around 180m above Ordnance Datum (AOD) north of Pilsley. There are a series of prominent north-south trending ridges, and some of the settlements tend to cluster on top of these (e.g. Newton in the adjacent Pinxton to Newton and Huthwaite (LA08) area, Pilsley, Clay Cross).

2.1.7 At the south-eastern end of this section, the area is characterised by a shallow valley to the west of the Newton ridge and south of Tibshelf.

Figure 3: Community area context map



## Key transport infrastructure

2.1.8 The nearest main road through the Stonebroom to Clay Cross area is the A61, which runs north-south through Clay Cross, linking Alfreton and Chesterfield.

2.1.9 Local roads in the Stonebroom to Clay Cross area include the B6025 Alfreton Road, B6014 Doe Hill Lane/Station Road, Pilsley Road, Morton Road, Stonebroom Lane, Pewit Lane, Evershill Lane and Padley Wood Lane.

2.1.10 The route of the Proposed Scheme would converge on the Erewash Valley Line from the south-east and then run in parallel with it for approximately 3km before connecting to it south-east of Clay Cross. The nearest railway stations are to the south at Alfreton on the Erewash Valley Line or to the north at Chesterfield on the Midland Main Line.

2.1.11 The route of the Proposed Scheme would cross the Silverhill Trail (a promoted route[4] and part of the National Cycle Network) and three public rights of way (PRoW), including two bridleways and one public footpath, which provide links between scattered dwellings and surrounding villages. In addition, the route of the Proposed Scheme would cross paths within Doe Hill Community Park at two locations.

## Socio-economic profile

2.1.12 Within the BDC area, construction accounts for the largest proportion of businesses (12%) alongside professional, scientific and technical (12%) sectors with business administration and support services (11%). In the NEDDC area, the construction sector accounts for the largest proportion of businesses (15%) with the professional, scientific and technical (12%) and agriculture, forestry and fishing (9%) sectors also accounting for relatively large proportions.

2.1.13 According to the Annual Population Survey (2016)[5], the employment rate[6] within the BDC area was 75% (36,600 people) and 77% in the NEDDC area (45,100 people). In 2016, the unemployment[7] rate in both the BDC area and the NEDDC area was 4%.

2.1.14 According to the Annual Population Survey (2016)[8], 22% of BDC area residents aged 16-64 were qualified to National Vocational Qualification Level 4 (NVQ4) and above, while 8% of residents had no qualifications. In the NEDDC area, 32% of residents aged 16-64 were qualified to NVQ4 and above, with 5% of its residents having no qualifications.

## Notable community facilities

2.1.15 The main concentrations of community facilities are in the nearby towns of Alfreton, to the south of the Stonebroom to Clay Cross area, and Bolsover and Chesterfield, to

[4] 'Promoted route' refers to those PRoW or other paths which are 'promoted' destinations in their own rights as a recreational resource.
[5] *Annual Population Survey*, (2016), NOMIS; Available online at: http://www.nomisweb.co.uk
[6] The proportion of working age (16-64 year olds) residents that is in employment. Employment comprises the proportion of the total resident population who are 'in employment'.
[7] Refers to people without a job who were available to start work in the two weeks following their interview and who had either looked for work in the four weeks prior to interview or were waiting to start a job they had already obtained. As the unemployed form a small percentage of the population, the APS unemployed estimates within local authorities are based on very small samples so for many areas would be unreliable. To overcome this ONS has developed a statistical model that provides better estimates of total unemployed for unitary authorities and local authority districts (unemployment estimates for counties are direct survey estimates), NOMIS.
[8] *Annual Population Survey*, (2016), NOMIS; Available online at: http://www.nomisweb.co.uk

the north-east and north respectively. The settlements within the Stonebroom to Clay Cross area provide a smaller range of local services.

2.1.16 Tibshelf is a village, with community facilities including a medical practice, Tibshelf Infant and Nursery School, Tibshelf Community School, two churches, Tibshelf Village Hall, and three public houses and hotels.

2.1.17 Pilsley is a village, with community facilities including a medical practice; Pilsley Primary School; three places of worship; a village hall; and a public house.

2.1.18 Stonebroom is a village, with community facilities including a medical practice; Stonebroom Primary and Nursery School; two churches; and a public house.

2.1.19 Morton is a village with community facilities that include Morton Primary School; a church; and a public house.

## Recreation, leisure and open space

2.1.20 Stonebroom to Clay Cross is a semi-rural area, with a number of relatively small settlements surrounded by open space, farmland and some woodland. It is crossed by several PRoW and other paths open to the public, including the Silverhill Trail, part of DCC's 'Phoenix Greenways' network. This section of the Silverhill Trail is also part of National Cycle Network route 67. One bridleway and one footpath cross the Erewash Valley Line on overbridges.

2.1.21 Doe Hill Community Park lies close to Stonebroom, within the parish of Tibshelf, and is managed by a community group in collaboration with D. The park was created on the site of a former open cast coal mine. Paths within the park form circular and figure-of-eight walks, and are open to walkers, cyclists and horse riders, and provide through access between Doe Hill Lane to the north and Love Lane to the south. The latter is a former road recently converted to a bridleway (Tibshelf Bridleway 3), also crossing the Erewash Valley Line.

## Policy and planning context

### *Planning framework*

2.1.22 Volume 1 provides an overview of the policy case for HS2. Relevant development plan documents and policies have been considered in relation to environmental topics, as part of considering the Proposed Scheme in the local context.

2.1.23 The following adopted local plan documents have been considered and referred to where appropriate to the assessment:

- saved policies of the Bolsover District Local Plan (2000)[9];
- saved policies of the North East Derbyshire Local Plan (2005)[10];
- saved policies of the Derby and Derbyshire Minerals Local Plan (2000) and First Alteration to the Plan (November 2002)[11];
- saved policies of the Derby and Derbyshire Waste Local Plan (2005)[12]; and
- saved policies of the Amber Valley Local Plan (2006)[13].

2.1.24 There are no areas with adopted Neighbourhood Plans in proximity to the Stonebroom to Clay Cross area; however, Tibshelf Parish Council has applied for the parish of Tibshelf to be designated as a Neighbourhood Area in order to commence preparation of a Neighbourhood Plan.

### *Committed development*

2.1.25 Committed developments are defined as developments with planning permission and sites allocated for development, or safeguarded for minerals in adopted development plans, on or close to the land required for the Proposed Scheme.

2.1.26 Where it is likely that committed developments will have been completed by 2023, these will be identified as 'future baseline' schemes and taken into account in the formal ES.

2.1.27 Where there are committed developments that are considered likely to be constructed between 2023 and 2033, i.e. at the same time as the Proposed Scheme, they would be considered as receptors for the operation of HS2, but also potentially to give rise to cumulative impacts with the Proposed Scheme during construction. Any cumulative impacts and likely significant effects will be reported in the formal ES.

2.1.28 Planning applications yet to be determined at the time of the formal ES and sites that are proposed allocations in development plans that have yet to be adopted, on or close to the Proposed Scheme, are termed 'proposed developments'. These will not be included in the assessment in the formal ES.

## Ongoing design development

2.1.29 Design development continues on this section of route as further engineering and environmental baseline is collated, including from field surveys, and as part of ongoing consultation and stakeholder engagement. Any further changes resulting

[9] Bolsover District Council, (2000), *Saved policies of the Bolsover District Local Plan*. Available online at: http://www.bolsover.gov.uk/LocalPlan/statement.htm
[10] North East Derbyshire District Council (2005), *Saved policies of North East Derbyshire Local Plan*. Available online at: http://www.ne-derbyslocplan.net/
[11] Derby City Council and Derbyshire County Council, (2002), *Saved policies of the Derby and Derbyshire Minerals Local Plan* (April 2000) and First Alteration to the Plan. Available online at: https://www.derbyshire.gov.uk/images/DD%20MLP%20Part%201_tcm44-189489.pdf
[12] Derby City Council and Derbyshire County Council, (2005), *Saved policies of the Derby and Derbyshire Waste Local Plan*. Available online at: https://www.derbyshire.gov.uk/images/D%26D%20WLP_tcm44-189473.pdf
[13] Amber Valley Borough Council (2006) *Amber Valley Local Plan*. Available online at: http://www.ambervalley.gov.uk/environment-and-planning/planning/community-planning/adopted-local-plan.aspx

from this will be reported in the formal ES. The main areas of design development being considered include:

- refinement of connections to the conventional railway network;
- temporary and permanent utility diversions;
- refinement of the realignment of roads and PRoW that would cross the route of the Proposed Scheme;
- refinement of drainage features required for rail and highways;
- refinement of maintenance access routes and access to balancing ponds;
- additional environmental features required to mitigate likely significant environmental effects;
- accommodation works and crossings of the Proposed Scheme for private means of access;
- refinement of construction compound locations and site haul routes; and
- refinement of auto-transformer station locations.

## 2.2 Description of the Proposed Scheme

2.2.1 The following section describes the main features of the Proposed Scheme in the Stonebroom to Clay Cross area, including the proposed environmental mitigation measures that have been identified to date. Further general information on typical permanent features is provided in Volume 1, Section 5. Similarly, a general description of the approach to mitigation is explained in Volume 1, Section 9.

2.2.2 Land required for operation of the Proposed Scheme is described in this section and is shown on Volume 2: Map Series CT-06. Land also required for construction is described in Section 2.3 and shown on Volume 2: Map Series CT-05.

### Overview

2.2.3 The Proposed Scheme through the Stonebroom to Clay Cross area would be approximately 5.2km long. The route would extend from near Newton in the south-east and travel north-west towards Stonebroom and then north towards Clay Cross.

2.2.4 The Sheffield Southern spur links the eastern leg of the HS2 main line to the conventional railway network (the Erewash Valley Line), which provides an onward connection to the Midland Main Line. This would allow classic compatible HS2 trains[14] to travel to and from Sheffield Midland Station, with some trains stopping en-route at Chesterfield.

2.2.5 The Sheffield Southern spur would meet the Erewash Valley Line near Stonebroom. From that point, the route of the Proposed Scheme would run closely parallel to the eastern side of the Erewash Valley Line, then in a shared corridor with it, for

[14] 'Classic compatible' trains will be built to fit the existing UK rail infrastructure and will be used to operate high speed services on HS2, then continue on the existing conventional railway network

approximately 3km. At a point to the south-east of Clay Cross, a connection would be formed between Sheffield Southern spur and the existing Erewash Valley Line so that conventional compatible trains could run onwards using the conventional railway network owned by Network Rail.

2.2.6 To facilitate the connection of the Proposed Scheme to the existing Erewash Valley Line and Midland Main Line, modifications would be required to the existing conventional rail infrastructure in the Derbyshire and South Yorkshire areas. These modifications would include increasing the number of lines from two to four, between the point where the Sheffield Southern spur would connect with the Erewash Valley Line and Clay Cross Junction, including electrification and re-signalling. To support these works Network Rail's existing rail systems compounds would require re-locating. The electrification and re-signalling would require new compounds for the signalling and electrification equipment.

2.2.7 This section of the route is illustrated on maps CT-06-602b to CT-06-607 in the Volume 2: LA09 Map Book.

2.2.8 All dimensions in the sections below are approximate.

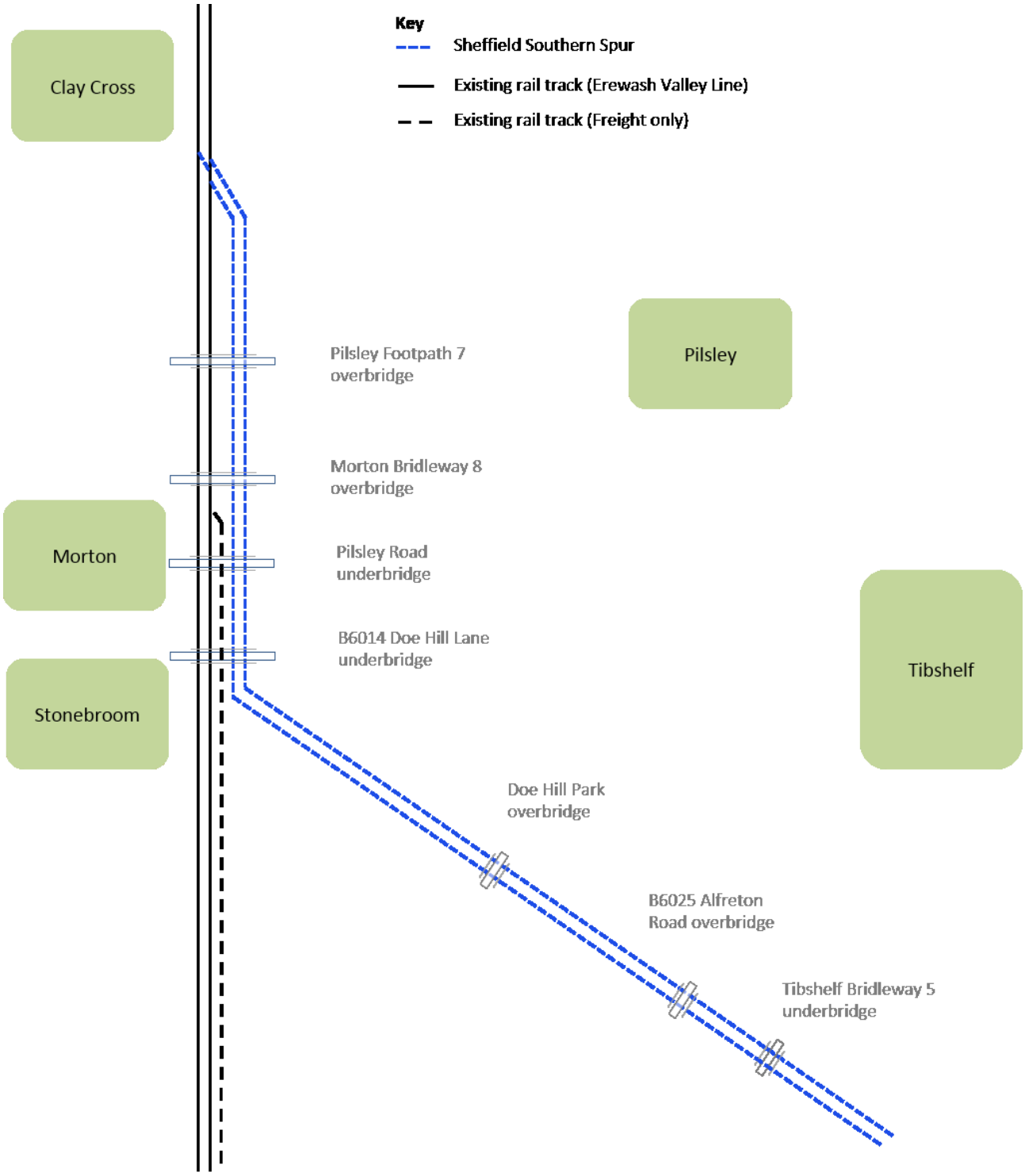
2.2.9 In the Stonebroom to Clay Cross area, the Sheffield Southern spur (referred to as the route of the Proposed Scheme in this section) would be carried on the following features:

- embankments for a total length of 1.5km (Blackwell South, Blackwell North and Stonebroom embankments); and
- cuttings for a total length of 3.8km (Blackwell, Stonebroom and Morton cuttings).

2.2.10 The Proposed Scheme in the Stonebroom to Clay Cross area is illustrated in Figure 4 and described in two separate sections below.

2.2.11 In general, features are described along the route of the Proposed Scheme from south to north and from east to west as they cross the Proposed Scheme, as shown on Map Series CT-06 in the Volume 2: LA09 Map Book.

Figure 4: Key permanent features of route of the Proposed Scheme in the Stonebroom to Clay Cross area



### *Blackwell South embankment to Stonebroom cutting*

2.2.12 The Sheffield Southern spur would enter the Stonebroom to Clay Cross area from the Pinxton to Newton and Huthwaite area (LA08) to the south. This part of the spur would start on the Blackwell south embankment, travelling north-west, into the Blackwell cutting before transitioning onto the Blackwell north embankment. It would continue further west in the Stonebroom cutting before passing onto the Stonebroom embankment within Doe Hill Community Park.

2.2.13 This section of the route is illustrated on maps CT-06-602b to CT-06-603 in the Volume 2: LA09 Map Book.

2.2.14 Key features of this 1.4km section would include:

- a section of Blackwell south embankment, 104m in length, up to 3m in height continuing from the Pinxton to Newton and Huthwaite area (LA08). There would be areas of landscape mitigation planting on both sides of the route of the Proposed Scheme to provide visual screening for properties in Newton, Blackwell and Tibshelf, Banks Farm and users of surrounding PRoW and the Silverhill Trail, and integrate the Proposed Scheme into the surrounding landscape (see Volume 2: Map CT-06-602b, E5, E6 and F5);
- Alfreton Road East culvert, 700m south-east of the Silverhill Trail, to carry an unnamed watercourse under the route of the Proposed Scheme (see Volume 2: Map CT-06-602b, E5 to F5);
- Blackwell cutting, 182m in length, up to 2m deep and 27m in width. There would be areas of landscape mitigation planting adjacent to both sides of the cutting to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: Map CT-06-602b, F5 to G6);
- Blackwell north embankment, 291m in length and up to 24m in height, with areas of landscape mitigation planting on both sides of the route of the Proposed Scheme to provide visual screening for receptors in Newton, Blackwell and Tibshelf, residents of Banks Farm and users of the Silverhill Trail and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: Map CT-06-602b, G5 to H6) and areas of woodland habitat creation to the south-west to provide replacement habitat (see Volume 2: Map CT-06-602b, G5 to H4);
- Alfreton Road West culvert, 75m south-east of the Silverhill Trail, to carry an unnamed watercourse under the route of the Proposed Scheme on its existing alignment (see Volume 2: Map CT-06-602b, G5 to G6);
- Tibshelf Bridleway 5 accommodation underbridge, 18m in length, carrying the route of the Proposed Scheme over the Silverhill Trail, which would remain on its existing alignment (see Volume 2: Map CT602b, H5 to H6);
- realignment of Tibshelf Bridleway 5, 80m south-east of its current alignment for 280m, to join the Silverhill Trail, crossing the route of the Proposed Scheme via the Tibshelf Bridleway 5 accommodation underbridge and then return to its

existing route (see Volume 2: Map CT-06-602b, H5 to H6);

- Stonebroom cutting, 815m in length, up to 12m in depth, and 98m in width. There would be areas of landscape mitigation planting adjacent to both sides of the cutting to provide visual screening to users of Alfreton Road and Doe Hill Community Park and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: Map CT-06-602b, H5 to J6 and CT-06-603, A5 to E5);
- Alfreton Road auto-transformer station, 49m by 24m, on the south-western side of the route of the Proposed Scheme, within an area of landscape mitigation planting. Access would be provided from the B6025 Alfreton Road (see Volume 2: Map CT-06-602b, H5 to I5);
- B6025 Alfreton Road overbridge, 96m in length, crossing at existing ground level and 12m above track level (see Volume 2: Map CT-06-602b, I5 to I6); and
- Doe Hill Park overbridge, 74m in length. The overbridge would lie within Doe Hill Community Park and would be provided to maintain connectivity between the two sides of the park (see Volume 2: Map CT-06-603, D5).

2.2.15 This section of the route would include two maintenance access points allowing vehicle access to the route of the Proposed Scheme. There would also be maintenance access routes, hedgerow planting and utilities works within this section, which may include works to low voltage overhead or underground lines, gas pipes, sewers and telecommunication cables.

2.2.16 Construction of this section would be managed from the Stonebroom embankment satellite compound, which is described in Section 2.3, and shown on map CT-05-603 in the Volume 2: LA09 Map Book.

### *Stonebroom embankment to Morton cutting*

2.2.17 The route of the Proposed Scheme would continue from Stonebroom cutting onto Stonebroom embankment within Doe Hill Community Park, converging on the Erewash Valley Line and turning northwards to run parallel to it. From Stonebroom embankment, the route would continue into the Morton cutting before connecting to the Erewash Valley Line.

2.2.18 This section of the route is illustrated on maps CT-06-603 to CT-06-605 in the Volume 2: LA09 Map Book.

2.2.19 Key features of this 3.8km section would include:

- Stonebroom embankment, 1km in length and up to 16m in height. There would be areas of landscape mitigation planting to both sides of the embankment to provide visual screening for residents of Morton Lodge, Pilsley, Tibshelf and farmsteads to the north-east, and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: Map CT-06-603, E5 to J6 and CT-06-604, A7 to D6);

- Doe Hill culvert, 400m south-east of the B6014 Doe Hill Lane/Station Road and within Doe Hill Community Park, to carry an unnamed tributary of Morton Brook under the route of the Proposed Scheme (see Volume 2: Map CT-06-603, F5);
- two ecological mitigation ponds to the east of the route of the Proposed Scheme to provide replacement habitat for great crested newt (see Volume 2: Map CT-06-603, F6 to F7);
- an area of landscape mitigation planting to the east of the route of the Proposed Scheme and south of Doe Hill Lane, to provide visual screening to properties on Doe Hill Lane (see Volume 2: Map CT-06-603, G6 to G7);
- Doe Hill retaining wall, 278m in length and up to 8m in height, located to the west of the route of the Proposed Scheme where it runs parallel to the Erewash Valley Line, to provide structural support to the Stonebroom embankment (see Volume 2: Map CT-06-603, F5 to H6);
- B6014 Doe Hill Lane underbridge, 33m in length, with a height clearance of 4.7m, to carry the route of the Proposed Scheme over Doe Hill Lane (see Volume 2: Map CT-06-603, H6);
- lowering the vertical alignment of Doe Hill Lane on both sides of the route of the Proposed Scheme to improve headroom. This would also entail a consequential lowering of Stonebroom Lane at its junction with Station Road, west of the Erewash Valley Line, by up to 40m (see Volume 2: Map CT-06-603, H6-G7);
- a balancing pond for railway drainage and associated pumping station, 60m north-east of the route of the Proposed Scheme with access from the B6014 Doe Hill Lane/Station Road (see Volume 2: Map CT-06-603, G7 to H6);
- Morton Brook culvert, 100m north-west of the B6014 Doe Hill Lane/Station Road, to carry Westwood Brook under the route of the Proposed Scheme (see Volume 2: map CT-06-603, H6);
- a replacement floodplain storage area, 100m to the east of the route of the Proposed Scheme, adjacent to the Westwood Brook. Following excavation, the area would be re-graded back to tie into existing ground level (see Volume 2: Map CT-06-603, H7 to H8);
- Pilsley Road underbridge, 24m in length, and with a height clearance of 7m to carry the route of the Proposed Scheme over Pilsley Road (see Volume 2: Map CT-06-603, I6);
- Morton cutting, 2.8km in length and up to 10m in height and 51m in width. (see Volume 2: Map CT-06-604, D6 to J7 and CT-06-605, A6 to H5);
- Morton Bridleway 8 overbridge, 60m in length to carry the Morton Bridleway 8 over the route of the Proposed Scheme. The overbridge would cross the Erewash Valley Line and the route of the Proposed Scheme near Padleywood Farm (see Volume 2: Map CT-06-604, G6 to H5);

- two ecological mitigation ponds with surrounding woodland habitat creation, to the east of the route of the Proposed Scheme, to provide replacement habitat for great crested newt (see Volume 2: Map CT-06-605, C7 to C10);
- Pilsley Footpath 7 overbridge, 36m in length to carry the Pilsley Footpath 7 over the route of the Proposed Scheme. The overbridge would cross the Erewash Valley Line and the route of the Proposed Scheme adjacent to Padley Wood Ancient Woodland (see Volume 2: Map CT-06-605, D5 to D6);
- a balancing pond for railway drainage and associated pumping station, 30m west of the route of the Proposed Scheme with access from the Clay Cross waste water treatment works access track (see Volume 2: Map CT-06-605, F5 to G4);
- an ecological mitigation pond with surrounding woodland habitat creation to the west of the route of the Proposed Scheme to provide replacement habitat for great crested newt (see Volume 2: Map CT-06-605, F3 to G4); and
- permanent diversion of the River Rother for 650m, to the east of the route of the Proposed Scheme, to avoid the need for it to pass under the route of the Proposed Scheme twice via new culverts (see Volume 2: Map CT-06-605, G6 to J6 and CT-06-606, A6 to A7).

2.2.20 This section of the route would include three maintenance access points allowing vehicle access to the route of the Proposed Scheme. There would also be maintenance access routes, hedgerow planting and minor utilities works within this section, which may include works to low voltage overhead or underground lines, gas pipes, sewers and telecommunication cables.

2.2.21 Construction of this section would be managed from the Stonebroom embankment satellite compound as described above and the Morton Cutting Pond satellite compound, which is described in Section 2.3, and shown on Map CT-05-605 in the Volume 2: LA09 Map Book.

## Demolitions

2.2.22 As set out in Volume 1, as the design develops, it is likely that not all the properties reported within the assessment would need to be demolished, for example where not all of the land is required for permanent works.

2.2.23 At this stage of design development, it is anticipated that demolition of four existing residential properties, two commercial/ business properties and 11 other structures would be required to construct the permanent features in the Stonebroom to Clay Cross area. These could be needed for construction of the permanent features or, in some cases, to enable the construction works for the Proposed Scheme. Demolitions would be managed from the same construction compounds as the permanent features with which they are associated. The identified demolitions are listed in Section 2.3 under the relevant construction compounds.

## 2.3 Construction of the Proposed Scheme

2.3.1 This section sets out the key construction activities that are envisaged to build the Proposed Scheme in the Stonebroom to Clay Cross area. The construction arrangements described in this section provide the basis for the assessment presented in this ES.

2.3.2 Land used only for construction purposes would be restored as agreed with the owner of the land and the relevant planning authority once the construction works in that area are complete.

2.3.3 Land would be required permanently for the key features of the Proposed Scheme described in Section 2.2.

2.3.4 During the construction phase, public roads and PRoW routes would remain open for public use wherever reasonably practicable. Where such routes would cross the Proposed Scheme and require diversion, the alternative road or PRoW crossing the Proposed Scheme would be constructed prior to any closure of existing roads or PRoW wherever reasonably practicable. Where they would cross the Proposed Scheme in proximity to their existing alignment, a temporary alternative alignment may be required. In some instances, diverted or realigned roads or PRoW may need to pass through areas required for construction of the Proposed Scheme. Routes through these areas would be provided where it is safe and reasonably practicable to do so.

2.3.5 Volume 1, Section 5 and Section 6 provide details of the permanent features of the Proposed Scheme and typical construction techniques. For the purposes of the environmental assessment, standard construction techniques as provided in Volume 1, Section 6 have been assumed.

### Code of Construction Practice

2.3.6 All contractors will be required to comply with a Code of Construction Practice (CoCP). In addition, Local Environmental Management Plans (LEMPs) will be produced for each local authority area. The CoCP and LEMPs will be the means of controlling the construction works associated with the Proposed Scheme, and set out monitoring requirements, with the objective of ensuring that the effects of the works on people and the natural environment are reduced insofar as reasonably practicable. The CoCP will contain generic control measures and standards to be implemented throughout the construction process. The LEMPs will set out how the project will adapt and deliver the required environmental and community protection measures within each area through the implementation of specific measures required to control dust and other emissions from activities in the area.

2.3.7 In addition, HS2 Ltd has produced a Community Engagement Framework[15] which sets out how HS2 Ltd and its contractors, as well as their sub-contractors, would undertake

[15] HS2 Ltd (2017) Community Engagement Framework. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/625971/hs2_community_engagement_framework.pdf

community engagement during the construction of the HS2 project. The framework is being implemented on Phase One of HS2 and is applicable to all phases of HS2.

2.3.8 The objectives of the framework include:

- to set out how HS2 Ltd and its contractors would undertake community engagement during the construction of the project;
- to provide clarity and reassurance to HS2 Ltd's stakeholders about how community engagement activity would be managed; and
- to help HS2 Ltd be a good neighbour to local communities, including by providing accurate and timely information about construction works and offering opportunities to influence them, where appropriate.

2.3.9 A draft CoCP has been prepared and is published alongside this document, in Supporting document: Draft Code of Construction Practice. It will remain a draft document through the Parliamentary process and the CoCP will be finalised by Royal Assent. The CoCP sets out measures to be implemented by the appointed construction contractor.

## Overview of the construction process

2.3.10 Building and preparing the Proposed Scheme for operation will comprise the following general stages:

- advance works including: site investigations further to those already undertaken; preliminary mitigation works; and preliminary enabling works;
- civil engineering works including: establishment of construction compounds; haul routes, site preparation and enabling works; main earthworks and structure works; site restoration; removal of construction compounds where the compound is not required for railway installation works; and associated utility diversions;
- railway installation works including: establishment of construction compounds; infrastructure installation; connections to utilities; changes to the existing rail network; and removal of construction compounds;
- site finalisation works; and
- systems testing and commissioning.

2.3.11 General information about the construction process is set out in more detail in Volume 1, Section 6, and the draft CoCP including:

- the approach to environmental management during construction and the role of the CoCP (Section 2);
- working hours (Section 5);
- management of construction traffic (Section 14); and
- handling of construction materials (Section 15).

## Advance works

2.3.12 General information about advance works can be found in Volume 1, Section 6. Advance works will be required before the main construction works commence and typically include:

- further detailed site investigations and surveys for proposed construction compounds;
- further detailed environmental surveys;
- advance mitigation works including, where appropriate, contamination remediation, habitat creation and translocation, landscape planting and built heritage survey and investigation;
- advance site access works;
- site establishment with temporary fence construction; along with soil stripping and vegetation removal; and
- utility diversions and new utility connections for facilities associated with the Proposed Scheme.

## Engineering works

### *Introduction*

2.3.13 Construction of the Proposed Scheme would require the following broad types of engineering works along the entire length of the route, and within land adjacent to the route:

- civil engineering works, including earthworks such as embankments and cuttings and erection of bridges and viaducts; and
- works to install, test and commission railway systems, including track, overhead line equipment, communications and signalling equipment and traction power supply.

2.3.14 The construction of track and railway systems works in open areas would include the installation of track form, rails, infill material, minor drainage works, and installation of electrification, signalling and communication equipment.

2.3.15 The construction of the Proposed Scheme would be divided into sections, each of which would be managed from compounds. The compounds would act as the main interface between the construction work sites and the public highway, as well as performing other functions as described below. Compounds would either be main compounds or satellite compounds. Satellite compounds are generally smaller than main compounds. Compounds would either be used for civil engineering works, for railway installation works, or for both.

### *General overview of construction compounds*

2.3.16 Main compounds would be used for core project management staff (i.e. engineering, planning and construction delivery) and commercial and administrative staff. These

teams would directly manage some works and coordinate the works at the satellite compounds. In general, a main compound would include:

- space for the storage of bulk materials;
- space for the receipt, storage and loading and unloading of excavated material;
- an area for the fabrication of temporary works equipment and finished goods;
- fuel storage;
- plant and equipment storage including plant maintenance facilities; and
- office space for management staff, limited car parking for staff and site operatives, and welfare facilities.

2.3.17 Satellite compounds would be used as the base to manage specific works along a section of the route. Depending on the nature and extent of the works to be managed, these satellite compounds could include office accommodation for staff, local storage for plant and materials, car parking for staff and site operatives, and welfare facilities.

2.3.18 Two civil engineering satellite compounds would be located in the Stonebroom to Clay Cross area. These would be managed from the Heath South cutting main compound, located in the Tibshelf to Shuttlewood area (see Volume 2: Community Area report LA10, Tibshelf to Shuttlewood).

2.3.19 Following the completion of civil engineering works, both of these compounds would continue to be used, along with two additional compounds, as railway installation satellite compounds. Staveley railhead main compound, located in the Staveley to Aston area (see Volume 2: Community Area report LA11, Staveley to Aston) would be used to manage the railways installation satellite compounds in the Stonebroom to Clay Cross area as well as the movement of imported track ballast and railway installation materials, by rail, throughout the eastern leg of the Proposed Scheme.

2.3.20 The location of construction compounds in the Stonebroom to Clay Cross area is shown on Figure 5. Map Series CT-05 (in the Volume 2: LA09 Map Book) show in detail the locations of the construction compounds described below.

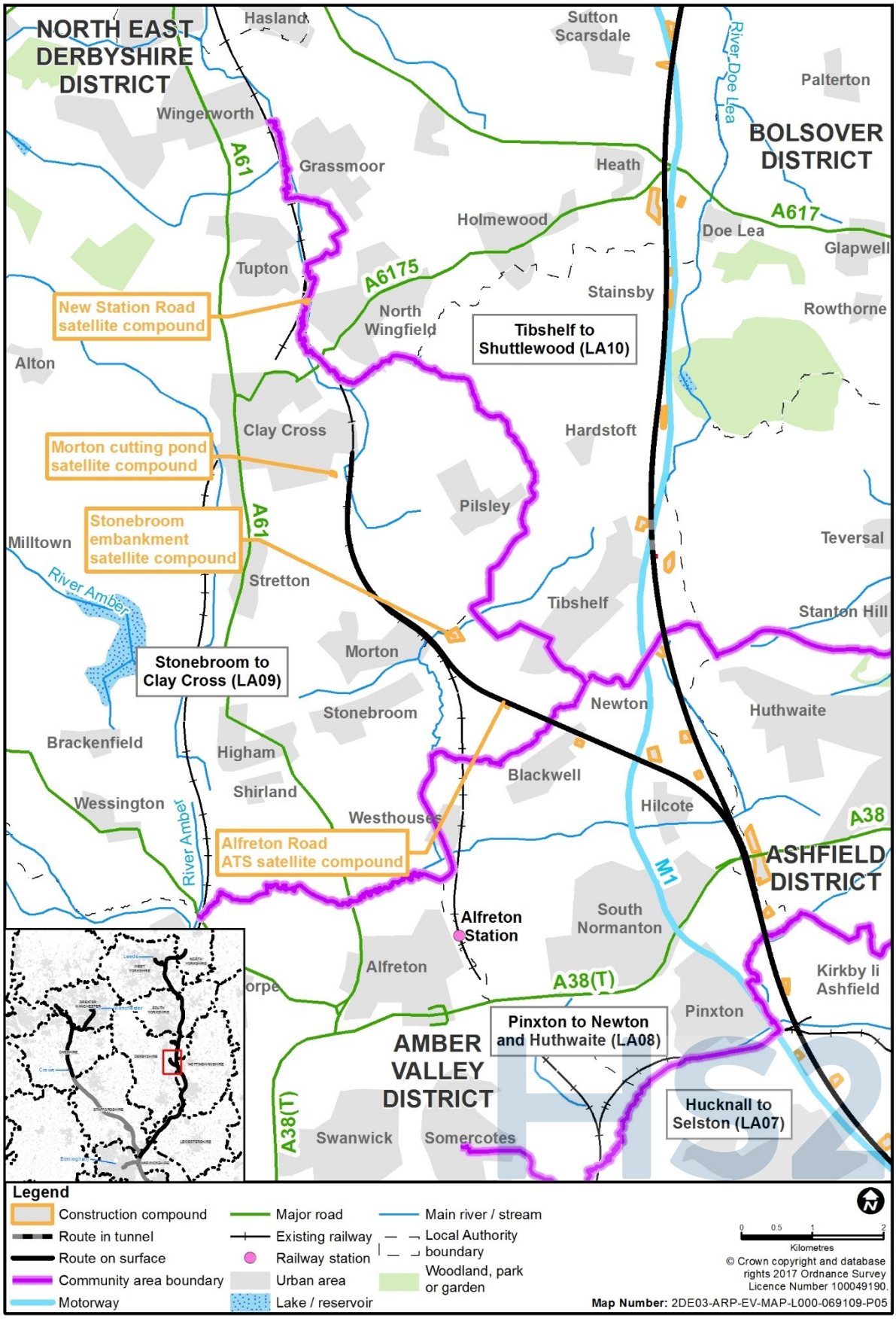
2.3.21 Figure 6 shows the management relationship for civil engineering works compounds and Figure 7 for the railway installation works. Details of the works associated with individual compounds are provided in subsequent sections of this report.

2.3.22 In the Stonebroom to Clay Cross area there would be no worker accommodation for the construction workforce.

2.3.23 Soil stripped as part of the works prior to it being used when the land is reinstated, would be stored for the duration of construction. The location of topsoil and subsoil storage areas would generally be adjacent to compounds and areas of construction activity. These areas are referred to as material stockpiles and those adjacent to compounds are shown on maps CT-05-602b to CT-05-607, in the Volume 2: LA09 Map Book.

2.3.24 Further information on the function of compounds is provided in Section 6 of Volume 1 and Section 5 of the draft CoCP. This includes general provisions for the operation of compounds, such as security fencing, lighting, utilities supply, site drainage and codes of worker behaviour.

Figure 5: Location of construction compounds in the Stonebroom to Clay Cross area



### *Construction traffic routes, site haul routes and transfer nodes*

2.3.25 The movement of construction vehicles, whether to carry materials, plant, other equipment and workforce, or moving empty, would take place within the construction compounds, on public roads and between the compounds and working areas. Where reasonably practicable, movements between the construction compounds and the working areas would be on designated haul routes within the construction site, often along the line of the route of the Proposed Scheme or running parallel to it.

2.3.26 The construction compounds would provide the interface between the construction works and the public road or railway network. The likely road routes to access compounds in the Stonebroom to Clay Cross area are described in the subsequent sections of this report.

2.3.27 It may be necessary to undertake minor works including a number of minor highways and junction improvements along public roads that would be used as construction traffic routes but are at a distance from the route of Proposed Scheme. These minor works will be reported in the formal ES.

2.3.28 Areas of land are also required for the storage, loading and unloading of bulk earthworks materials that are moved to and from the site on public roads. These would allow transfer of material between road vehicles and site vehicles during construction to balance traffic movements on the road network. These areas are referred to as transfer nodes and are shown on Maps CT-05-602b to 607 in the Volume 2: LA09 Map Book.

## Construction compounds

2.3.29 This section provides a summary of the civil engineering works to be managed from the construction compounds in the Stonebroom to Clay Cross area, as illustrated in Figure 6, and railway systems works as illustrated in Figure 7. All dates and durations of activities and number of workers are indicative. All compounds would undertake initial site set-up works and, at the end of its use, finalisation works including site reinstatement, landscaping and planting (as necessary).

Figure 6: Construction compounds for civil engineering works

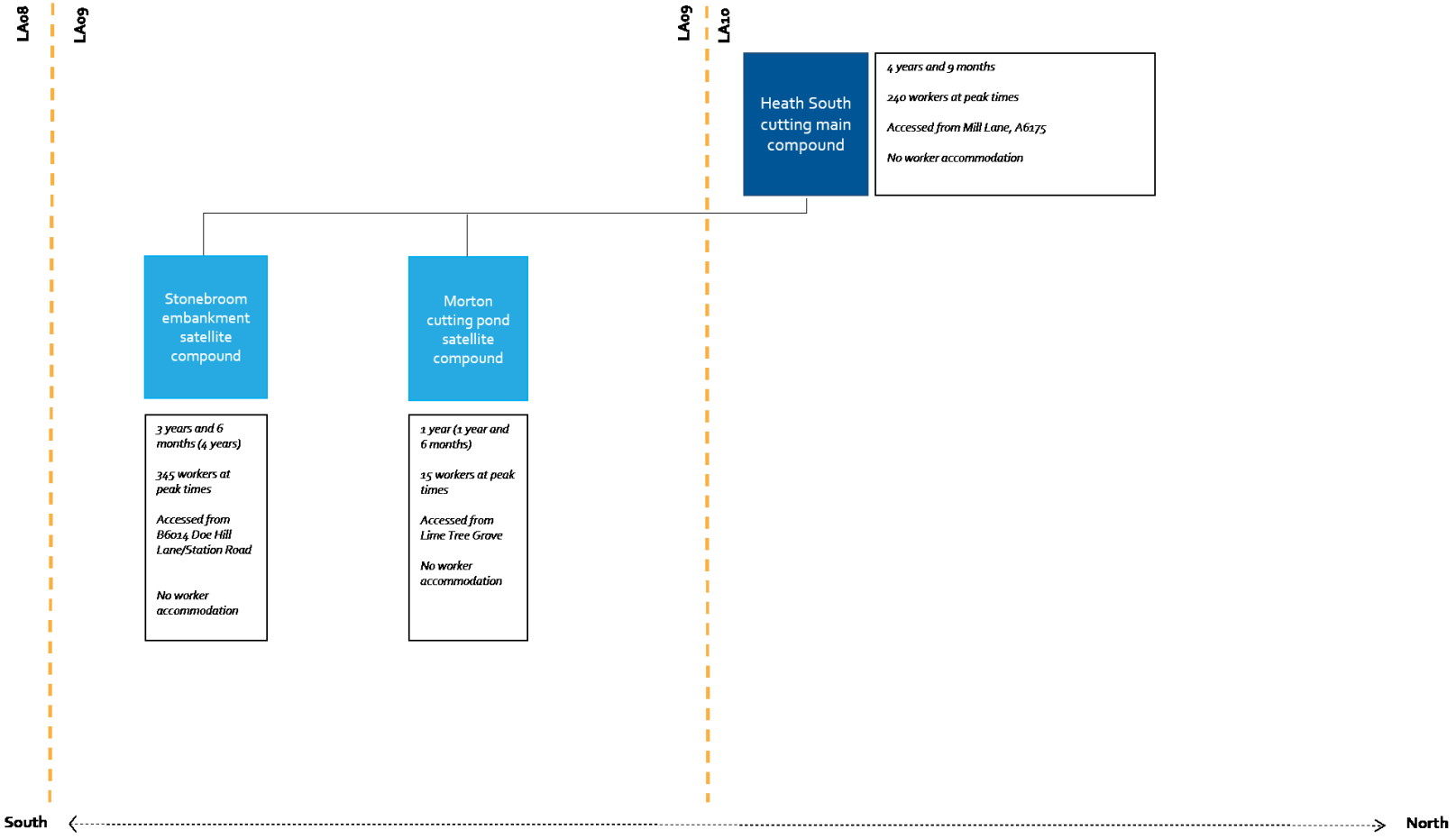
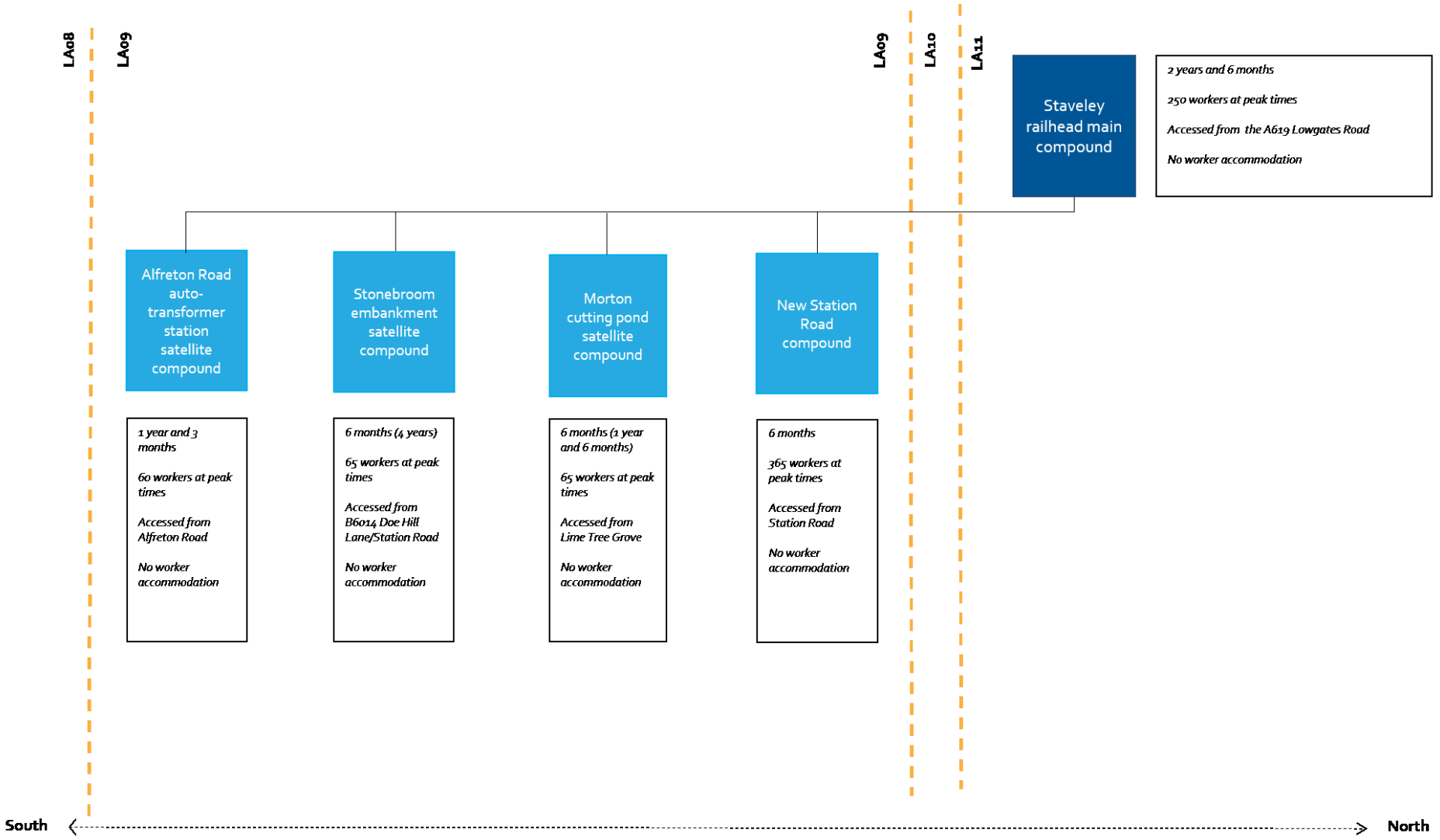


Figure 7: Construction compounds for railway system works



### *Alfreton Road auto-transformer station satellite compound*

2.3.30 This compound would be used to manage railway system installation works in the Stonebroom to Clay Cross area, as illustrated in Figure 7. (Volume 2: Map CT-05-602b, H5).

2.3.31 No demolitions would be required as a result of the works to be managed from this compound.

2.3.32 Key railway systems installation works to be managed from this compound would include construction of the Alfreton Road auto-transformer station, which would take one year and 3 months to complete.

### *Stonebroom embankment satellite compound*

2.3.33 This compound would be used to manage civil engineering works in the Stonebroom to Clay Cross area, as illustrated in Figure 6 (see Volume 2: Map CT-05-603, F8 to H8) for a period of three years and six months. On completion of civil engineering works, this compound would remain as a satellite compound for railway systems installation works for a period of six months.

2.3.34 The works to be managed from this compound would require demolition of the following buildings and structures, as described in Table 1.

Table 1: Demolitions to be managed from the Stonebroom embankment satellite compound

| Description | Location | Feature resulting in the demolition |
|---|---|---|
| Residential | | |
| Two residential properties at Station Cottages | Station Cottages, Doe Hill Lane, Tibshelf | Stonebroom embankment |
| Two residential properties at Doe Hill Station | Stonebroom Lane, Stonebroom, Alfreton | Stonebroom embankment |
| **Commercial** | | |
| Commercial unit (vehicle storage) | Station Yard, Doe Hill Lane, Tibshelf | Stonebroom embankment |
| Industrial unit | West of Station Cottages, Doe Hill Lane, Tibshelf | Stonebroom embankment |
| **Other** | | |
| Four outbuildings | Off Alfreton Road, Tibshelf | Stonebroom cutting |
| Two outbuildings | Off Station Yard, Doe Hill Lane, Tibshelf | Stonebroom embankment |
| Three Garages | Doe Hill Lane, Tibshelf | Stonebroom embankment |
| Overbridge for Morton Bridleway 8 | East of Evershill Lane, Morton | Morton cutting |
| Overbridge for Pilsley Footpath 7 | North of Padley Wood, Pilsley | Morton cutting |

2.3.35 The compound would be used to manage the construction of the following bridges:

- Tibshelf Bridleway 5 accommodation underbridge, which would take nine months to complete;
- the B6025 Alfreton Road overbridge, which would take one year to complete;
- Doe Hill Park overbridge, which would take nine months to complete;
- B6014 Doe Hill Lane underbridge, which would take one year to complete;
- Pilsley Road underbridge, which would take one year to complete;
- Morton Bridleway 8 overbridge, which would take nine months to complete; and
- Pilsley Footpath 7 overbridge, which would take one year to complete.

2.3.36 The compound would be used to manage the following embankments and cuttings:

- Blackwell south embankment, which would take one year and three months to complete;
- Blackwell cutting, which would take six months to complete;
- Blackwell north embankment, which would take one year to complete;
- Stonebroom cutting, which would take one year and three months to complete;
- Stonebroom embankment, which would take two years and three months to complete; and
- Morton cutting, which would take one year to complete.

2.3.37 This compound would manage the Stonebroom embankment transfer node for the storage and loading and unloading of bulk earthworks materials, which would be moved to and from the site on public roads. The transfer node would be accessed from the B6014 Doe Hill Lane and via site haul routes (Volume 2: Map CT-05-603, H8 to I9).

2.3.38 The works to be managed from this compound would require temporary closure of the B6014 Doe Hill Lane/Station Road for a period of 10 months where it passes under the existing Erewash Valley Line, to allow construction of the Doe Hill Lane underbridge and modifications to Doe Hill Lane to create additional headroom. This would include the consequential lowering of Stonebroom Lane at its junction with Station Road, west of the Erewash Valley Line.

2.3.39 The works to be managed from this compound would require the following works to PRoW and other public paths:

- temporary realignment of the Silverhill Trail for a period of one year, with users diverted to the north-west, onto Tibshelf Bridleway 5 for a distance of 200m. On completion of construction, the Silverhill Trail would remain on its existing alignment, crossing the route of the Proposed Scheme on the Tibshelf

Bridleway 5 accommodation overbridge;

- permanent realignment of Tibshelf Bridleway 5, to the south-east of its current alignment, to join the route of the Silverhill Trail, where it passes under the Tibshelf Bridleway 5 underbridge; and
- temporary realignment of the Doe Hill Park footpath for a period of one year, with users diverted to the west of its current alignment. On completion of construction of the Doe Hill Park overbridge, the Doe Hill Park footpaths would be permanently realigned to maintain connectivity between paths either side of the Stonebroom cutting where it passes through Doe Hill Community Park.

2.3.40 The works to be managed from this compound would require the following works to watercourses:

- Alfreton Road east culvert, which would take six months to complete, to carry an unnamed watercourse under the Blackwell south embankment;
- Alfreton Road west culvert, which would take six months to complete, to carry an unnamed watercourse under the Blackwell north embankment;
- Doe Hill culvert, which would take six months to complete, to carry an unnamed watercourse under the Stonebroom embankment;
- Morton Brook culvert, which would take six months to complete, to carry the Westwood Brook under the Stonebroom embankment; and
- the permanent diversion of the River Rother for a distance of 650m to the east of the route of the Proposed Scheme.

2.3.41 It is currently anticipated that temporary or permanent diversions of utilities may be required as a result of the works to be managed from this compound. These will be reported in the formal ES.

2.3.42 Key railway systems installation works to be managed from this compound would include works to the conventional railway, which would take six months to complete.

### *Morton cutting pond satellite compound*

2.3.43 This compound would be used to manage civil engineering works in the Stonebroom to Clay Cross area, as illustrated in Figure 6 (Volume 2: Map CT-05-605, F4 to G3) for a period of one year. On completion of civil engineering works, this compound would remain as a satellite compound for railway systems installation works for a period of six months.

2.3.44 No demolitions would be required as a result of the works to be managed from this compound.

2.3.45 This compound would be used to manage the construction of the balancing pond, west of Morton cutting, which would take nine months to complete.

2.3.46 Key railway systems installation works to be managed from this compound would include conventional railway connections, which would take six months to complete.

### *New Station Road satellite compound*

2.3.47 This compound would be used to manage railway system installation works in the Stonebroom to Clay Cross area, as illustrated in Figure 7 (Volume 2: Map CT-05-607, C6 and D6).

2.3.48 No demolitions would be required as a result of the works to be managed from this compound.

2.3.49 Key railway systems installation works to be managed from this compound would include conventional railway connections, which would take six months to complete.

## Construction waste and material resources

2.3.50 Excavated material (defined as excluding topsoil and subsoil) generated across the Proposed Scheme would be reused as engineering fill material or in the environmental mitigation earthworks of the Proposed Scheme, where suitable and reasonably practicable, either with or without treatment.

2.3.51 Forecasts of the amount of construction, demolition and excavation waste that would be produced during construction of the Proposed Scheme are reported in Volume 3: Route-wide effects.

2.3.52 Local excess or shortfall of excavated material within the Stonebroom to Clay Cross area would be managed through the integrated design approach adopted for the Proposed Scheme, with the aim of contributing to an overall balance of excavated material on a route-wide basis. The overall balance of excavated material will be presented in Volume 3 of the formal ES.

## Commissioning of the railway

2.3.53 Commissioning is the process of testing the infrastructure to ensure that it operates as expected. It would be carried out in the period prior to opening. Further details are provided in Volume 1, Section 6.

## Construction programme

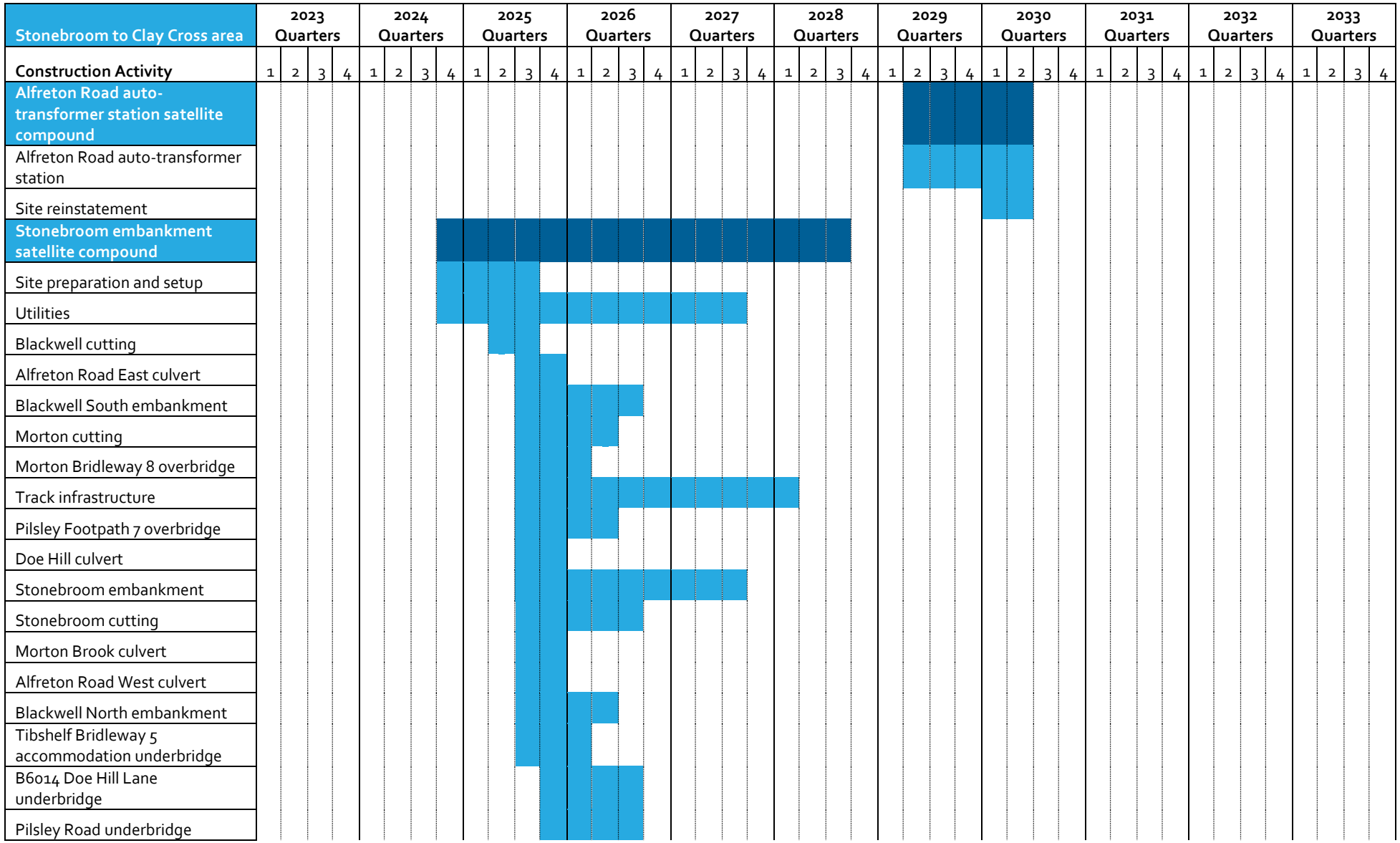
2.3.54 A construction programme illustrating indicative periods for each of the core construction activities described above is provided in Figure 8. Construction durations referred to in the following sections of this report are based on this indicative programme.

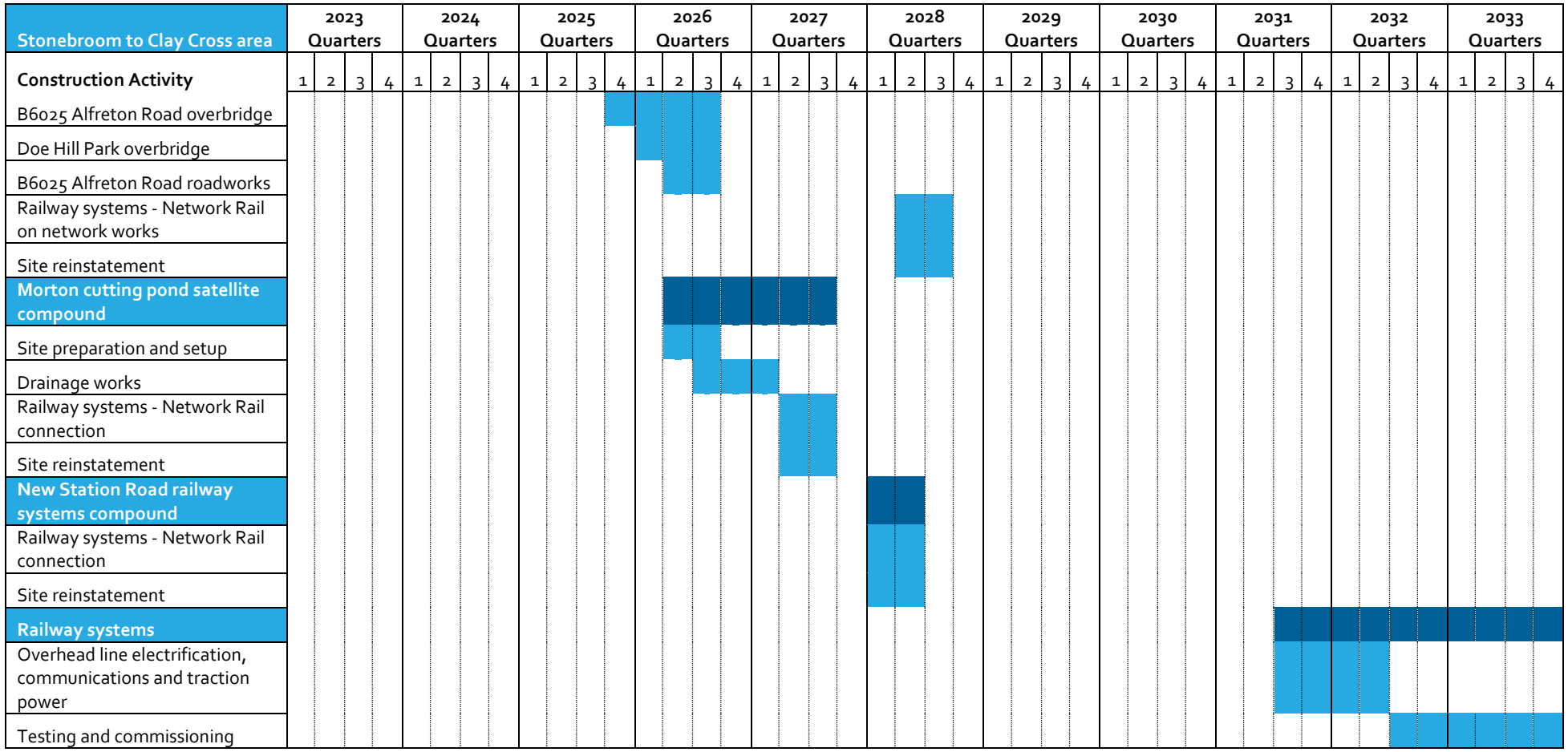
## Monitoring during construction

2.3.55 The appointed contractor would be required to undertake the necessary monitoring for each environmental topic to comply with the requirements of the CoCP, the relevant LEMP and any additional consent requirements. Any actions that may be necessary for compliance would be reported to the nominated undertaker and remedial action identified.

2.3.56 The CoCP and the relevant LEMP would set out inspection and monitoring procedures to assess the effectiveness of measures to prevent or reduce environmental effects during construction. Relevant local authorities and consenting authorities, such as the Environment Agency, would be consulted on the monitoring procedures to be implemented prior to construction commencement.

Figure 8: Indicative construction programme between 2023 and 2033




Stonebroom to Clay Cross area
2023 Quarters
2024 Quarters
2025 Quarters
2026 Quarters
2027 Quarters
2028 Quarters
2029 Quarters
2030 Quarters
2031 Quarters
2032 Quarters
2033 Quarters
Construction Activity
1 2 3 4
B6025 Alfreton Road overbridge
Doe Hill Park overbridge
B6025 Alfreton Road roadworks
Railway systems - Network Rail on network works
Site reinstatement
Morton cutting pond satellite compound
Site preparation and setup
Drainage works
Railway systems - Network Rail connection
Site reinstatement
New Station Road railway systems compound
Railway systems - Network Rail connection
Site reinstatement
Railway systems
Overhead line electrification, communications and traction power
Testing and commissioning

## 2.4 Operation of the Proposed Scheme

### Introduction

2.4.1 This section describes the operational characteristics of the Proposed Scheme in the Stonebroom to Clay Cross area. Volume 1, Section 4 describes the envisaged operational characteristics of the Proposed Scheme and how they change when the remainder of Phase Two, as a whole, is operational.

### HS2 services

2.4.2 It is anticipated that there would be up to four trains per hour each way passing through the Stonebroom to Clay Cross area. Services are expected to operate between 05:00 and midnight from Monday to Saturday and 08:00 and midnight on Sunday.

2.4.3 In this area, trains would run at speeds of up to 225mph (360kph). The trains would be either single 200m trains or two 200m trains coupled together, depending on demand and time of day.

### Maintenance

2.4.4 Volume 1, Section 4 describes the maintenance regime for the Proposed Scheme.

2.4.5 Asset performance and condition monitoring would be undertaken using asset condition monitoring and unattended measurement systems fitted to the HS2 passenger rolling stock. Intrusive inspections would be carried out during the maintenance period. The maintenance approach would be a combination of risk based, preventative and reactive maintenance.

2.4.6 Provision for railway maintenance vehicles along the eastern leg of the route of the Proposed Scheme would be made at the Staveley infrastructure maintenance depot (IMD) in the Staveley to Aston area (LA11). Further information on the Staveley IMD can be found in Volume 2: Community Area Report LA11: Staveley to Aston.

### Operational waste and material resources

2.4.7 The assessment of the likely significant environmental effects associated with the disposal of operational waste will be undertaken for the Proposed Scheme as a whole and reported in Volume 3: Route-wide effects of the formal ES.

2.4.8 Forecasts of the amount of waste arising from track maintenance and ancillary infrastructure and the associated potential significant environmental effects will also be reported in the formal ES.

### Monitoring during operation

2.4.9 The nominated undertaker would be responsible for monitoring during operation of the Proposed Scheme. Proposed indicative area-specific monitoring measures for each environmental topic area are presented in Sections 4 to 15 of this ES, based on the current level of assessment.

2.4.10 Relevant local authorities and consenting authorities, such as the Environment Agency, will be consulted on the monitoring procedures to be implemented prior to construction commencement.

## 2.5 Route section alternatives

2.5.1 The strategic, route-wide and route corridor alternatives to the Proposed Scheme and local alternatives considered prior to July 2017 are presented in Volume 1, Introduction and methodology and in the Alternatives report as a supporting document to the working draft ES. The local alternatives considered for the Proposed Scheme within the Stonebroom and Clay Cross area since the route announcement in July 2017 are described in this section.

2.5.2 In this area, the route of the Proposed Scheme would be carried on embankments and in cuttings.

2.5.3 As part of the design development process since July 2017, consideration has been given to the impact of the Proposed Scheme on local residents of the Stonebroom to Clay Cross area, environmental receptors including: Tibshelf Sidings Local Wildlife Site; Padley Wood Local Wildlife Site; Padley Wood Ancient Woodland; sections of Rykneld Street Roman road Scheduled Monument; and the Grade II* listed Church of Holy Cross in Morton.

2.5.4 Further consideration will be given to the construction and engineering options in this area, including design and construction methods, and alternative engineering options. Further studies are ongoing and will be reported in the formal ES.

### Sheffield spur alignment

2.5.5 During the design development process since the announcement of the preferred route in July 2017, further consideration has been given to the route of the Sheffield spur (which falls within the Pinxton to Newton and Huthwaite area (LA08) and the Tibshelf to Shuttlewood area (LA10), as well as the Stonebroom to Clay Cross area). The route of the Sheffield spur would provide a link from the HS2 main line to the existing conventional rail network, connecting to either the Erewash Valley Line or MML, providing for services to Sheffield and Chesterfield. Four options were taken forward to a more detailed appraisal where engineering and construction feasibility, cost and environmental impacts were considered. A summary of the outcomes of the preliminary appraisal of the alternative options is described in Volume 2, Community area report LA08, Pinxton to Newton and Huthwaite.

# 3 Stakeholder engagement and consultation

## 3.1 Introduction

3.1.1 HS2 Ltd's approach to stakeholder engagement and consultation on the Proposed Scheme is set out in Volume 1, Section 3.

3.1.2 Since the initial preferred route announcement in November 2016, HS2 Ltd has carried out a programme of informal stakeholder engagement and formal consultation with a broad range of stakeholders.

3.1.3 A variety of mechanisms have been used to enable an open and inclusive approach to engagement and consultation, reflecting the differing requirements and expectations of stakeholders.

3.1.4 Whilst stakeholders have informed the design and assessment of the Proposed Scheme to-date, it is important to note that this is an ongoing process. Feedback from the consultation on the working draft ES and emerging scheme design and ongoing engagement will continue to be considered as part of the ongoing design and assessment of the Proposed Scheme ultimately presented in the formal ES. There will be further consultation undertaken on the formal ES by Parliament following deposit of the hybrid Bill.

## 3.2 Key stages of Phase 2a engagement and consultation

3.2.1 The process of engagement remains ongoing. A summary of engagement undertaken or underway since the initial preferred route announcement in November 2016 is provided in Table 2.

Table 2: Mechanisms and timeline of stakeholder engagement since route announcement

| Engagement and consultation activity and mechanisms | Date |
|---|---|
| Phase 2b initial preferred route announcement | 15 November 2016 |
| Phase 2b route refinement and property consultations | 15 November 2016-9 March 2017 |
| Phase 2b information events to support the route refinement and property consultations | January -February 2017 |
| Confirmation of Phase 2b route announcement | 17 July 2017 |
| Start date of engagement with local communities and stakeholders on the confirmed Phase 2b route | July 2017 |
| Consultation on the draft EIA and Equality Impact Assessment (EQIA) Scope and Methodology Report (SMR) to inform the EIA and EQIA and the proposed relocation of the Eastern Leg Rolling Stock Depot | 17 July 2017-29 September 2017 |
| Phase 2b information events to support SMR and Eastern Leg Rolling Stock Depot consultations | September 2017 |
| Phase 2b information events to provide update on design development | June-July 2018 |
| Phase 2b consultation on the working draft ES and working draft EQIA | October-December 2018 |

### Draft EIA SMR consultation

3.2.2 The draft EIA SMR was formally consulted on between July and September 2017 and was issued to statutory bodies, non-government organisations and local authorities. It was also available on the Government's website, allowing comment by local interest groups and the public. One hundred and seven responses to the draft EIA SMR were received, as a result of which changes were made to the SMR. These are set out in the SMR Consultation Summary Report published alongside this working draft ES, and will be used to inform the assessment methodologies applied for the formal ES.

### Consultation on the working draft ES and ongoing engagement

3.2.3 As set out in Volume 1, the working draft ES is being formally consulted upon. The consultation is taking place during October 2018 to December 2018. A parallel consultation on the working draft EQIA is also being undertaken during this period. As part of the process of consultation, stakeholders are invited to comment on the Proposed Scheme and the working draft ES and EQIA Reports which inform it.

3.2.4 These consultations and wider feedback from ongoing stakeholder engagement will continue to be considered as part of the ongoing design of the Proposed Scheme, the assessment and identification of mitigation opportunities for the Stonebroom to Clay Cross area. A consultation summary report will be published with the formal ES explaining how the responses have been taken into consideration.

## 3.3 Informing the Proposed Scheme

3.3.1 The main purpose of stakeholder engagement and consultation at this early stage is to inform the Proposed Scheme. Volume 1 details the engagement and consultation undertaken prior to initial preferred route announcement in November 2016.

3.3.2 The main themes to emerge from stakeholder engagement in the Stonebroom to Clay Cross area since the route announcement in November 2016, and which are informing the Proposed Scheme are:

- temporary and permanent land requirements during construction and operation;
- refining the location of balancing ponds and environmental mitigation to reduce the loss of agricultural land;
- provision of access to severed agricultural land, including access under viaducts and the provision of farm access tracks;
- retention or realignment of PRoW such as at Bridleway 5 and the Silverhill Trial; Morton Bridleway 8 and Pilsley Footpath 7;
- temporary or permanent changes to road access including Doe Hill Lane, Pilsley Road, Pewitt Lane and Alfreton Road;
- issues around traffic on Doe Hill Lane and Alfreton Road during construction;
- impacts on access to local community educational /care /sporting /leisure /cultural facilities for example at Doe Hill Community Park and Tibshelf High

School; and

- impacts on local businesses.

3.3.3 Stakeholder feedback will continue to be considered as part of the ongoing design of the Proposed Scheme and will be reported in the formal ES.

## 3.4 Engagement and consultation with stakeholder groups

### Communities

3.4.1 Community stakeholders in the Stonebroom to Clay Cross area include a range of local interest groups, local facility and service providers, schools and educational establishments. Engagement on the Proposed Scheme has been undertaken with Doe Hill Community Park Community Group (including representatives from HS2 Blackwell Group), Doe Hill Community Park (Banks Group), and Derbyshire Local Access Forum.

3.4.2 The purpose of this engagement has been to give affected communities the opportunity to raise issues in relation to the Proposed Scheme. Community stakeholders have been provided with information on the development of the Proposed Scheme, as a basis from which to identify potential impacts and opportunities for mitigation within the local area, reflecting local conditions and issues.

3.4.3 Engagement has been, and will continue to be, undertaken with schools and educational establishments, in particular, with those within proximity to the Proposed Scheme and those with specialist interests or catering to the needs of vulnerable people within the community. This has informed the assessment of community and health in the working draft ES, while also informing the separate EQIA being undertaken in parallel to the EIA.

3.4.4 As part of the consultation process for this working draft ES, public events are being held in communities across the route of the Proposed Scheme. Communities have been notified of these events through a range of publicity in the community area and also through the www.gov.uk/hs2 website. Documents have been made available online and in community libraries. Members of local communities and other interested parties have been invited to engage on issues pertinent to the working draft ES and the development of the Proposed Scheme design.

3.4.5 Table 3 summarises key engagement undertaken with community stakeholders to date, including the focus of the engagement and how this has informed the design of the Proposed Scheme.

Table 3: Engagement to date with communities

| Stakeholder | Area of focus |
|---|---|
| Lee Rowley MP for North East Derbyshire | Meeting with MP for North East Derbyshire to discuss the route of the Proposed Scheme along the Sheffield South spur. |
| Doe Hill Community Park Community Group | Meeting to discuss access to the park during construction and operation. The park is a key local amenity feature. |
| HS2 Blackwell Group | Engagement over Sheffield South spur and potential impact on the village of Newton including demolitions (although this is LA08), disruption during construction and loss of Doe Hill Park. |
| Doe Hill Community Park (Banks Group) | Engagement over the extent of opencast mining operation that occurred onsite, Banks Group's planning obligations and potential mitigation at Doe Hill Community Park. |
| Derbyshire Local Access Forum (LAF) | Meetings to establish relationship with LAF and discuss any impacts on outdoor recreation, PROW, and access to the countryside. |
| Derbyshire Wildlife Trust | Meeting regarding the affected sites, potential hotspots and potential mitigations. |

## Local authorities and parish councils

3.4.6 Direct engagement has been undertaken with county, district and parish councils within the Stonebroom to Clay Cross area. The purpose of this engagement is to collate local baseline information and knowledge to inform the design and assessment, identify and understand local issues and concerns, provide access to wider stakeholders and communities and provide a mechanism for ongoing dialogue and discussion on the assessment and design development.

3.4.7 Engagement has focused on the technical areas which inform the assessment, including, landscape and visual, sound, noise and vibration and traffic and transport, amongst other topics.

3.4.8 Key issues identified during engagement with local authorities and parish councils include those summarised in Table 4.

Table 4: Engagement to date with local authorities and parish councils

| Stakeholder | Area of focus |
|---|---|
| Sheffield City Council | Meetings with technical leads to collate data and discuss key assessment topics including: air quality; land quality; sound, noise and vibration and waste. |
| Derbyshire County Council | General introductory and project update meetings, including briefings to Council leaders. Discussion on needs of LA, including approach to engagement with stakeholders |
| | Engagement with technical leads to collate data and discuss key assessment topics including: community and equality issues; ecology; flood risk, drainage and water; historic environment; landscape and visual issues; land quality; geotechnics; road diversions, realignments and structures; traffic and transport; utilities; and waste and material resources. |
| | Engagement over the Phase 2b Transport Assessment Scoping Report and Modelling. |
| | Discussion over access to land owned by Derbyshire County Council. |
| | HS2 Ltd attended a Department for Transport workshop with Derbyshire County Council and other local authorities in the East Midlands responsible for the East Midlands HS2 Growth |

| | |
|---|---|
| | Strategy. Derbyshire County Council shared their aspirations for a main construction compound at Staveley and for an extra train to stop at Chesterfield. |
| North East Derbyshire North East Derbyshire District Council | General introductory and project update meetings, including briefings to Council leaders and elected members. Discussion on needs of LA, including approach to engagement with stakeholders. |
| | Meetings with technical leads to collate data and discuss key assessment topics including: air quality; community and equality issues; ecology; historic environment; landscape and visual issues; land quality; geotechnics; socio-economics; sound, noise and vibration; utilities; and waste and material resources. |
| | Engagement over access to land owned by NEDDC. |
| Bolsover District Council | General introductory and project update meetings, including briefings to Council leaders and elected members. Discussion on needs of LA, including approach to engagement with stakeholders. |
| | Meetings with technical leads to collate data and discuss key assessment topics including: air quality; community and equality issues; ecology; historic environment; landscape and visual issues; land quality; geotechnics; socio-economics; sound, noise and vibration; utilities; and waste and material resources. |
| | Engagement over access to land owned by BDC. |
| Pilsley Parish Council | Engagement over local conditions and concerns regarding traffic, road closures and suitability of existing small single carriageway bridges for route diversions and potential for congestion. |
| Clay Cross Parish Council | Engagement over local conditions and concerns regarding the interface between the HS2 infrastructure and existing infrastructure on the Erewash Valley Line, traffic during construction, access to the M1 junction 29 along the A6175, local issues on flooding and draft local plan. |
| Tibshelf Parish Council | Meeting to discuss local conditions and concerns regarding disruption to the community and neighbouring communities of Blackwell and Newton during construction. |

3.4.9 Councils will continue to be engaged as part of the design development of the Proposed Scheme with ongoing dialogue on key topics such as highways, PRoW and the draft Code of Construction Practice (CoCP)[16].

## Expert, technical and specialist groups

3.4.10 Engagement has also been undertaken with expert, technical and specialist groups to provide appropriate specialist input, as and where appropriate. Stakeholders engaged to date include:

- Animal and Plant Health Agency;
- British Geological Survey;
- Campaign to Protect Rural England;
- Canal & River Trust;
- Clinical Commissioning Groups and Local Health Authorities - Hardwick Clinical Commissioning Group, NHS Southern Derbyshire Clinical

[16] Supporting document: Draft Code of Construction Practice

Commissioning Group;

- Coal Authority;
- Department of Environment, Food and Rural Affairs;
- Derbyshire Bat Conservation Group;
- D2N2 Local Enterprise Partnership;
- the East Midlands Chamber of Commerce;
- Environment Agency;
- Fera Science Ltd;
- Forestry Commission;
- Highways England;
- Historic England;
- Inland Waterways Association;
- National Farmers Union;
- National Trust;
- Natural England;
- Network Rail;
- Public Health England;
- The Ramblers;
- Royal Agricultural Society;
- Royal Society for the Protection of Birds;
- Royal Society of Wildlife Trusts and Derbyshire Wildlife Trust;
- Sustrans; and
- Woodland Trust.

3.4.11 A key purpose of this engagement has been to obtain detailed specialist baseline information to inform the working draft ES and the design development of the Proposed Scheme.

3.4.12 Further information about topic-specific engagement is provided in Sections 4 to 15, where relevant.

## Utilities

3.4.13 Engagement is also ongoing with utility companies and statutory stakeholders such as Cadent Gas; Severn Trent Water; Western Power Distribution; BT Openreach; Virgin Media; Instalcom; and, Century Link to establish what infrastructure exists in the Stonebroom to Clay Cross area and how it may need to be modified as part of the Proposed Scheme.

## Directly affected individuals, major asset owners and businesses

3.4.14 This group includes those with property potentially affected by the Proposed Scheme, including individuals, major asset owners and businesses within the Stonebroom to Clay Cross area.

3.4.15 Engagement is ongoing with farmers and growers whose land or property would be directly affected by the Proposed Scheme whether permanently or temporarily. The purpose of this engagement has been to obtain baseline information and provide them with the opportunity to raise issues and discuss mitigation in relation to the Proposed Scheme. For example, the location of environmental mitigation has been will seek to reduce the loss of agricultural land and the location of accommodation overbridges across the route will be considered to better reflect the needs of farmers.

3.4.16 Information gathered from two farm visits have informed the assessment presented in this working draft ES. Farm visits are ongoing and engagement will continue as the design and assessment develops.

3.4.17 Engagement is also continuing with key representatives for the farmers and growers industry, in particular with the National Farmers Union and Country Land, Business Association.

3.4.18 A route-wide programme of engagement is ongoing, in parallel to the working draft ES process. This engagement provides affected individuals, major asset owners and businesses the opportunity to raise issues and opportunities in relation to the Proposed Scheme and to gain an understanding of compensation and assistance available for property owners. Within the Stonebroom to Clay Cross area, an information event was held at Sharley Park Leisure Centre on 25 June 2018. Facilities were available at the event for affected individuals, major asset owners and businesses to have private meetings with HS2 staff.

3.4.19 Engagement has been undertaken with Banks Group.

3.4.20 HS2 Ltd is continuing to engage with directly affected individuals and major asset owners as the design and assessment develops.

# 4 Agriculture, forestry and soils

## 4.1 Introduction

4.1.1 This section provides a description of the current baseline for agriculture, forestry and soils and the likely impacts and significant effects of the construction and operation of the Proposed Scheme within the Stonebroom to Clay Cross area. Consideration is given to the extent and quality of the soil and land resources underpinning the primary land use activities of farming and forestry, and the physical and operational characteristics of enterprises engaged in these activities. Consideration is also given to diversification associated with the primary land uses, and to related land-based enterprises, notably equestrian activities.

4.1.2 Engagement with farmers and landowners has commenced and is ongoing. The purpose of the engagement has been to obtain baseline information on the scale and nature of the farm and forestry operations and related farm-based uses, and to provide farmers and landowners with the opportunity to raise issues and discuss mitigation in relation to the Proposed Scheme. Engagement undertaken with farmers and landowners will be documented in a farm pack for each farm holding within a Phase 2b Farmers and Growers Guide[17].

4.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2: LA09 Map Book.

## 4.2 Scope, assumptions and limitations

4.2.1 The assessment scope, key assumptions and limitations for the agriculture, forestry and soils assessment are set out in Volume 1, Section 8 and the Scope and Methodology Report (SMR)[18].

4.2.2 The study area for the agriculture, forestry and soils assessment covers all land required for the construction and operation of the Proposed Scheme. The resources and receptors that are assessed within this area are agricultural land, forestry land and soils, together with farm and rural holdings. The assessments of the impacts on agricultural land quality and forestry land are made with reference to the prevalence of best and most versatile (BMV) land and forestry land in the general locality, taken as a 4km corridor centred on the route of the Proposed Scheme.

4.2.3 The quality of agricultural land in England and Wales is assessed according to the Agricultural Land Classification (ALC)[19] system, which classifies agricultural land into five grades from excellent quality Grade 1 land to very poor quality Grade 5 land. Grade 3 is subdivided into Subgrades 3a and 3b. The main issue in the assessment of

[17] To be prepared for Phase 2b in due course, as per previous Phases found here: https://www.gov.uk/government/publications/hs2-guide-for-farmers-and-growers
[18] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report
[19] 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*

the impacts on agricultural land is the extent to which land of BMV agricultural quality (Grades 1, 2 and 3a) is affected by the Proposed Scheme.

4.2.4 Forestry is considered as a commercial land use feature providing resources such as timber or fuel. The impacts on this feature have been calculated quantitatively in terms of the physical extent of commercial forestry land required. The qualitative effects on forestry land and woodland are addressed principally in Section 7, Ecology and biodiversity and Section 11, Landscape and visual.

4.2.5 The primary functions provided by soils other than for food and biomass production, such as flood water attenuation, carbon storage or the support of ecological habitats, are identified in this section and the ability of the soils to fulfil their primary functions after construction of the Proposed Scheme is assessed. Soil attributes, other than for food and biomass production, are identified in this section, but the resulting function or service provided is assessed in other sections, notably Section 7, Ecology and biodiversity; Section 9, Historic environment; Section 11, Landscape and visual; and Section 15, Water resources and flood risk.

4.2.6 The main issue for farm holdings is disruption by the Proposed Scheme of the physical structure of agricultural holdings and the operations taking place upon them, during both construction and operational phases. Where any part of a farm or rural holding is required for the construction and operation of the Proposed Scheme, the whole land holding is considered part of the study area for impacts on this receptor.

4.2.7 Common assumptions that have been used in assessing the effects of the Proposed Scheme are set out in Volume 1, Section 8. These assumptions include the restoration of agricultural land that is required temporarily for construction to agricultural use, and the handing back of land used temporarily to the original landowner. It is also assumed that buildings and other farm infrastructure on the land holding will not be replaced as this would ultimately be at the discretion of the landowner. For this reason, financial compensation is not a consideration in the assessment of effects on farm holdings, as set out under Impacts on holdings below. In the majority of cases, the details of land use have been obtained from face-to-face interviews. Where this has not been possible, holding data has been obtained from publicly available sources.

## 4.3 Environmental baseline

### Existing baseline

4.3.1 This section sets out the main baseline features that influence the agricultural and forestry use of land within the Stonebroom to Clay Cross area. These include the underlying soil resources that are used for food and biomass production, as well as providing other services and functions for society, and the associated pattern of agricultural and other rural land uses.

### Soil and land resources

#### *Geology and soil parent materials*

4.3.2 A full description of the geological characteristics of the Stonebroom to Clay Cross area is provided in Section 10, Land quality and Section 15, Water resources and flood risk. The underlying geology of the study area is mapped by the British Geological

Survey[20] (BGS). Superficial deposits in the study area are confined to the valleys of the Morton Brook, east of Stonebroom, and the River Rother in the north, and comprise alluvial clay, silt, sand and gravel.

4.3.3 The bedrock geology is of Carboniferous-age, of the Pennine Coal Measures Group. The Pennine Coal Measures Group (of which the Pennine Middle and Lower Coal Measures Formations are components) includes interbedded grey mudstones, siltstones and pale grey sandstones, which developed in fluvial, marsh or shallow-marine environments. Coal seams are common within the formations.

4.3.4 The Pennine Middle Coal Measures Formation is mapped from Newton in the south of the study area to north of Morton, from where the bedrock is of the Pennine Lower Coal Measures Formation. There are narrow bands in which sandstone is more dominant that are generally aligned north to south throughout the study area.

### *Topography and drainage*

4.3.5 Topography in the study area is characterised by a series of valleys containing the River Rother and its tributaries. The slopes of the valley sides are fairly uniform or, as in the south, slightly convex.

4.3.6 The highest altitudes in the study area are at around 140m above Ordnance Datum (AOD) and are found on elongated ridges to the south-west of Tibshelf and at Padleywood Farm. The altitudes fall to around 115m AOD within the valleys of the River Rother and the Morton and Westwood Brooks. Slopes throughout the study area are predominantly shallow, up to 7 degrees. In the south of the study area, confined to an area west of Banks Farm, are moderate slopes which exceed 7 degrees (which precludes this land from being BMV land[19]).

4.3.7 Drainage of the land within the study area is via the River Rother, Morton Brook and the Westwood Brook, which generally drain northward.

4.3.8 The Environment Agency's Flood Map for Planning (rivers and sea)[21] has been used to scope the baseline flood risk for flooding from main rivers and ordinary watercourses. Land at risk of flooding by rivers is confined to the channels of the River Rother, Westwood Brook and Morton Brook, in which the land is classed as Flood Zone 3[22]. Further details are provided in Section 15, Water resources and flood risk.

### *Description and distribution of soil types*

4.3.9 The broad characteristics of the soils likely to be present in the study area are described by the Soil Survey of England and Wales[23] and their general distribution is shown on the National Soil Map[24]. Soils possessing similar characteristics are amalgamated into associations.

[20] British Geological Survey (2018). Geology of Britain viewer. Available online at: http://mapapps.bgs.ac.uk/geologyofbritain/home.html
[21] Environment Agency (2018). Flood Map for Planning. Available online at: https://flood-map-for-planning.service.gov.uk/
[22] The Environment Agency defines Flood Zone 3 as land having a 1 in 100 or greater annual probability of river flooding, or where water has to flow or be stored in times of flood. Flood Zone 2 is defined as land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding
[23] Soil Survey of England and Wales (1984), *Soils and their use in Midland and Western England*, Soil Survey of England and Wales, Bulletin No. 12, Harpenden
[24] Cranfield University (2001), *The National Soil Map of England and Wales 1:250,000 scale.* Cranfield University: National Soil Resources Institute.

4.3.10 There are two known soil associations mapped in this study area, in addition to a large area of land mapped as *disturbed* in the south and north. In the south, the disturbed land is mapped south of Tibshelf and east of Stonebroom, and in the north from north-west of Padleywood to west of Pilsley. Both areas are associated with shallow coal mining activity. The most prevalent soil mapped is the Dale association, which comprises stoneless clay or clay loam topsoil over slowly permeable grey clay subsoil. Profiles are typically poorly drained, mostly of Wetness Class[25] (WC) IV.

4.3.11 The contrasting Rivington 1 association is mapped to a very limited extent in the centre of the study area. Rivington 1 soils comprise sandy loam or sandy silt loam topsoil overlying sandstone or extremely stony sandy loam. Profiles are well drained, of WC I.

## Soil and land use interactions

### *Agricultural land quality*

4.3.12 The principal soil/land use interaction is the quality of the agricultural land resource. The ALC is based on the identification of physical limitations to the agricultural capability of land resulting from the interactions of soil, climate, topography and drainage.

4.3.13 The main soil properties that affect the cropping potential and management requirements of land are texture, structure, depth, stoniness and chemical fertility.

4.3.14 The combination of rainfall and accumulated temperature[26] limits all agricultural land in the study area to no higher than Grade 2, irrespective of soil and site properties. The interactions of climate with soil characteristics are also important in determining the wetness and droughtiness[27] limitations of the land.

4.3.15 The local agro-climatic data have been interpolated from the Meteorological Office's standard 5km grid point dataset[28] for three points within the study area. The data show climate in the area to be moist and cold to cool. The number of field capacity days[29] (FCDs), when the moisture deficit[30] is zero, ranges from 178 to 181 days per annum. This is higher than average for lowland England (150 days) and generally constrains agricultural cultivations and soil handling for relatively long periods over winter. Moisture deficits, which give an indication of the liability of soils to droughtiness in summer, are moderate to moderately small.

4.3.16 Site factors include flood risk, which is likely to affect agricultural land quality within the River Rother valley and surrounding Westwood Brook, limiting land quality to

[25] The wetness class of a soil is classified according to the depth and duration of waterlogging in the soil profile and has six bands
[26] Accumulated temperature is the excess of daily air temperatures above 0°C, summed over the period of January to June
[27] A measure of the likely moisture stress in a crop arising from the crop's requirement for water exceeding the available water capacity in the soil
[28] Meteorological Office (1989), *Gridpoint Meteorological data for Agricultural Land Classification of England and Wales and other Climatological Investigations*
[29] Field Capacity Days (FCD) is a meteorological parameter which estimates the duration of the period when the soil moisture deficit is zero. Soils usually return to field capacity (zero deficit) during the autumn or early winter and the field capacity period, measured in days, ends in the spring when evapotranspiration exceeds rainfall and a moisture deficit begins to accumulate.
[30] The moisture deficit is a crop-related meteorological variable which represents the balance between rainfall and potential evapotranspiration calculated over a critical portion of the growing season

Subgrade 3b. Further details are provided in Section 15, Water resources and flood risk.

4.3.17 The main physical limitations that result from interactions between soil, climate and site factors are soil wetness and soil droughtiness. For soil wetness, each soil can be allocated a Wetness Class based on soil structure, evidence of waterlogging and the number of FCDs. The topsoil texture then determines its ALC grade. Soil droughtiness is determined by the moisture retention of different soil textures and thicknesses of each soil horizon, soil structures, stone content and moisture deficit.

4.3.18 The most prevalent soil type, comprising poorly drained fine loamy and clayey profiles of the Dale association, is most affected by wetness and workability. Under the climatic conditions of the study area, profiles of WC IV with heavy textured topsoils will be limited to Grade 4. If lighter, medium loam topsoils are present, the limitation on workability will be less severe, to Subgrade 3b. These grades are confirmed by published ALC survey mapping[31] to the east of Stonebroom, where the majority of the land surveyed is of Grade 4, although the detailed data is not available.

4.3.19 The well drained (WC I), coarse-textured soil profiles in the Rivington 1 association are affected mostly by soil droughtiness, the severity of which is determined by such factors as topsoil textures, stone content and depth to the sandstone bedrock. As crop moisture deficits are moderate to moderately small, droughtiness limitations are likely to be slight to moderate, limiting the potential ALC to Grade 2 or Subgrade 3a.

4.3.20 As set out in the SMR, the sensitivity of BMV land in the study area is determined relative to the abundance of such land in the area, set as a 4km corridor centred on the route of the Proposed Scheme. Department for Environment, Food and Rural Affairs (Defra) predictive mapping[32] shows that there is a low likelihood of encountering BMV agricultural land in the locality, which makes such land a resource of high sensitivity in this study area.

4.3.21 The preceding assessment of agricultural land quality attributed to the soil associations is based on interpretation of publicly available data and will be confirmed by detailed soil survey, as will be the detailed distribution of soil types and land in the various grades of the ALC. The results will be reported in the formal ES.

### *Other soil interactions*

4.3.22 Soil fulfils a number of functions and services for society in addition to those of food and biomass production, which are central to social, economic and environmental sustainability. These are outlined in sources such as the Soil Strategy for England[33] and the Government's White Paper, The Natural Choice: securing the value of nature[34,] and include:

- the storage, filtration and transformation of water, carbon and nitrogen in the biosphere;

[31] MAFF (1999). Agricultural Land Classification, Stonebroom, Derbyshire. Ref no 21/11
[32] Defra (2005), *Likelihood of Best and Most Versatile Agricultural Land*
[33] Defra (2009), *Soil Strategy for England*
[34] HM Government (2011), *The Natural Choice: securing the value of nature*

- the support of ecological habitats, biodiversity and gene pools;
- support for the landscape;
- the protection of cultural heritage;
- the provision of raw materials; and
- the provision of a platform for human activities, such as construction and recreation.

4.3.23 The floodplains of the River Rother, Morton Brook and Westwood Brook occupy land where water has to flow or be stored in times of flood, as set out in Section 15, Water resources and flood risk. The soils and floodplains in this study area function as water stores for flood attenuation, as well as providing ecological habitat.

## Land use

### *Land use description*

4.3.24 Agricultural land in this study area is predominantly in pasture, used to support a mix of dairy herds, beef herds, sheep flocks and equestrian enterprises. Land in arable cultivation is found in isolated parcels throughout. Fields are small to medium in size, with larger more regularly shaped fields in the north of the study area.

4.3.25 Woodland is found in three locations; along the Silverhill Trail at the south of the study area, at Doe Hill Community Park (restored coal colliery site), and along the existing Erewash Valley Line, adjacent to which is Padley Wood ancient woodland and additional broadleaved woodland. It is not yet known whether any of the woodlands affected by the Proposed Scheme are managed commercially.

4.3.26 A number of environmental designations influence land use within the study area. The whole area is a nitrate vulnerable zone, where statutory land management measures apply limiting the average amount of nitrogen from manufactured fertiliser and organic manures that can be applied to agricultural land in order to reduce nitrogen losses from agricultural sources to the natural water environment.

4.3.27 Some agricultural land is also subject to agri-environment management prescriptions that seek to retain and enhance the landscape and biodiversity qualities and features of farmland. These are associated with the Environmental Stewardship Scheme (the Entry Level Scheme (ELS) or Higher Level Scheme (HLS), or the Countryside Stewardship Scheme (CSS), which has been the main agri-environment scheme in England since 2015. The CSS incorporates elements of Environmental Stewardship, the England Woodland Grant scheme and Catchment Sensitive Farming grants.

4.3.28 Most Environmental Stewardship agreements, which were extensive and covered approximately 70% of agricultural land in England, have now ended, although existing agreements will run their course over the next few years. The higher tier and mid-tier options in the CSS are more focussed than Environmental Stewardship. Applications for CSS funding are competitive, and the area covered by the scheme is less than that covered under Environmental Stewardship. However, four new simpler non-competitive offers have been introduced in 2018 to complement the higher tier and mid-tier options, and open up the scheme to more farmers and land managers.

Holdings that have land entered into an agri-environment scheme are identified in Table 5.

### *Number, type and size of holdings*

4.3.29 Table 5 sets out the current understanding of main farm holdings within this study area. The details of holdings have been obtained from face-to-face interviews with farm owners and occupiers. Publicly-available sources have been used to obtain information about farm holdings where it has not yet been possible to arrange interviews and this information will be validated as survey work continues. Other farm holdings may be identified as survey work continues and the design develops. Effects on these farm holdings will be reported in the formal ES.

4.3.30 Table 5 also sets out the sensitivity of individual holdings to change. This is determined by the extent to which they have the capacity to absorb or adapt to impacts, which in turn is determined primarily by their nature and scale. In general terms, larger holdings have a greater capacity to change enterprise mix and scale, can better absorb impacts and are less sensitive. Units that rely on the use of buildings (such as intensive livestock and dairy farms, and horticultural units) are less able to accommodate change and have a higher sensitivity. Non-commercial land uses and units, such as pony paddocks associated with residential properties, have a low sensitivity.

4.3.31 Bank's Farm is not included in the table below as it is associated with the wider Mill Farm holding in the Tibshelf to Shuttlewood area (LA10) (see Volume 2: Community Area report LA10: Tibshelf to Shuttlewood), and therefore the effect of the Proposed Scheme on this holding is assessed in that report[35].

Table 5: Summary of characteristics of holdings

| Holding name | Holding type | Holding size (ha) | Diversification | Agri-environment scheme | Sensitivity to change |
|---|---|---|---|---|---|
| Land east of Silverhill Trail (north)* | Equestrian (non-commercial) | 2 | Not known | None | Low |
| Land east of Silverhill Trail (south)* | Grassland | 1 | Not known | None | Low |
| Land west of Silverhill Trail* | Grassland | 2 | Not known | None | Low |
| Ashmore Farm* | Arable | 38 | Not known | ELS and HLS | Medium |
| Land east of Alfreton Road* | Equestrian (non-commercial) | 1 | Not known | None | Low |
| Land west of Alfreton Road (north) | Equestrian (non-commercial) and sheep | 2 | None | None | Low |

[35] HS2 Phase 2b: Crewe to Manchester and West Midlands to Leeds, Section 4, Agriculture, forestry and soils

| Holding name | Holding type | Holding size (ha) | Diversification | Agri-environment scheme | Sensitivity to change |
|---|---|---|---|---|---|
| Land west of Alfreton Road (south)* | Equestrian (non-commercial) | 1 | Not known | None | Low |
| Land east of Love Lane* | Grassland | 19 | Not known | None | Medium |
| Doehill House Farm* | Equestrian (commercial) | 9 | Saddlery | None | Medium |
| Land east of Morton* | Grassland | 4 | Not known | None | Medium |
| Land north of Doe Hill Lane* | Grassland | 7 | Not known | ELS | Medium |
| Morton Lodge Farm* | Sheep | 23 | Not known | None | Medium |
| Hagg House Farm* | Beef cattle, arable | 51 | Not known | None | Medium |
| Land north of Morton* | Arable | 13 | Not known | None | Medium |
| Padleywood Farm | Arable, equestrian (non-commercial) | 48 | Solar farm | None | Medium |
| Land south of Danesmoor* | Grassland | 14 | Not known | None | Medium |
| Land west of Pilsley* | Grassland | 25 | Not known | None | Medium |
| Land at Hagg Hill* | Grassland | 14 | Not known | None | Medium |

* It has not yet been possible to arrange farm impact assessment interviews with these holdings. Publicly-available sources have been used to obtain the information presented.

## 4.4 Effects arising during construction

### Avoidance and mitigation measures

4.4.1 In addition to design features that would be included in the Proposed Scheme to mitigate the impacts on farm holdings, there is a need to avoid or reduce environmental impacts to soils during construction. Soil resources from the areas required temporarily and permanently for the Proposed Scheme would be stripped and stored. This would enable agricultural land that is required temporarily for construction to be returned to agricultural use. It would also enable soils to be returned to other uses, such as to support landscape planting and biodiversity, and to a suitable condition whereby they would be able to fulfil the identified function.

4.4.2 Compliance with the Code of Construction Practice (CoCP)[36] will avoid or reduce environmental impacts during construction. Those measures that are particularly relevant to agriculture, forestry and soils are set out in the draft CoCP and relate to:

- the reinstatement of agricultural land that is used temporarily during construction to agriculture, where this is the agreed end use (Section 6);
- the provision of a method statement within the farm pack for stripping, handling, storing and replacing agricultural and woodland soils to reduce risks associated with soil degradation on areas of land to be returned to agriculture and woodland following construction, based on detailed soil survey work to be undertaken prior to construction. This would include any remediation measures necessary following the completion of works. Where they occur, there will be special provisions for handling peat and peaty soils (Section 6);
- a requirement for contractors to monitor and manage flood risk and other extreme weather events, insofar as reasonably practicable, that may affect agriculture, forestry and soil resources during construction (Sections 5 and 16);
- arrangements for the maintenance of farm and field accesses affected by construction (Section 6);
- the protection and maintenance of existing land drainage and livestock water supply systems, where reasonably practicable (Sections 6 and 16);
- the protection of agricultural land adjacent to the construction site, including the provision and maintenance of appropriate stock-proof fencing (Sections 5, 6, 9 and 12);
- the adoption of measures to control the deposition of dust on adjacent agricultural crops (Section 7);
- the control of invasive and non-native species; and the prevention of the spread of weeds generally from the construction site to adjacent agricultural land (Section 9);
- the adoption of measures to prevent, insofar as reasonably practicable, the spread of soil-borne, tree, crop and animal diseases from the construction area (Sections 6 and 9); and
- liaison and advisory arrangements with affected landowners, occupiers and agents, as appropriate (Sections 5 and 6).

4.4.3 As part of the ongoing development of the design, measures will be incorporated to avoid or mitigate adverse impacts on agriculture, forestry and soils. At this stage, one specific measure has been incorporated; provision of Tibshelf Bridleway 5 underbridge would mitigate severance of access to land for Banks Farm (see Volume 2: Map CT-06-602b, H5 to H6).

[36] Supporting document: Draft Code of Construction Practice

4.4.4 As the design develops it will be necessary to continue to assess the requirement for access to severed parcels of agricultural land.

4.4.5 Upon completion of construction, it is currently anticipated that soils replaced for agricultural, forestry or landscape uses would be monitored to identify any unsatisfactory growing conditions during the five-year aftercare period.

4.4.6 Where agricultural uses are to be resumed on land disturbed during the construction of the Proposed Scheme, the design objective is to avoid any reduction in long-term capability, which would downgrade the quality of the disturbed land, through the adoption of good practice techniques in handling, storing and reinstating soils on that land. Poorly drained land, and land with heavier textured soils (of the Dale association and potentially within the disturbed areas), may also require particularly careful management, such as through the timing of cultivation and livestock grazing during the aftercare period, to ensure this outcome.

## Assessment of impacts and effects

4.4.7 The acquisition and use of land for the Proposed Scheme would interfere with existing uses of that land and, in some locations, preclude existing land uses or sever and fragment individual fields and operational units of agricultural and forestry land. This could result in potential effects associated with the ability of affected agricultural and forestry interests to access and effectively use residual parcels of land. There may also be the loss of, or disruption to, buildings and operational infrastructure such as drainage. The Proposed Scheme seeks to reduce this disruption and, where appropriate and reasonably practicable, incorporate residual parcels of land no longer effective for agricultural use due to their size and/or shape as part of environmental mitigation works, such as ecological habitat creation.

4.4.8 Land used to construct the Proposed Scheme would fall into the following main categories when work is complete:

- part of the operational railway or associated infrastructure and kept under the control of the operator;
- returned to agricultural use (with aftercare management to ensure stabilisation of the soil structure);
- used for drainage or replacement floodplain storage areas, which may also retain some agricultural use; or
- used for ecological and/or landscape mitigation.

### *Temporary effects during construction*

#### Impacts on agricultural land

4.4.9 Interpretation of publicly available data shows that the Proposed Scheme is likely to require approximately 50ha of agricultural land within the Stonebroom to Clay Cross area during the construction phase, of which approximately 5ha (10%) are likely to be classified as BMV land (predominantly of Subgrade 3a). This would be a low magnitude of impact on BMV land.

4.4.10 As BMV land in this local area is a receptor of high sensitivity, it is currently anticipated that the likely effect of the Proposed Scheme on BMV land during the construction phase would be moderate adverse, which would be significant.

4.4.11 Following completion of construction, temporary facilities would be removed and the topsoil and subsoil reinstated in accordance with the agreed end use for the land. Some permanently displaced soils may be used to restore land to agriculture or other uses with slightly deeper topsoil and subsoil layers, where appropriate.

### Nature of the soil to be disturbed

4.4.12 The sensitivity of the soils disturbed by construction activity reflects their textural characteristics, in the light of local FCDs, as set out in the SMR. In areas with the highest number of FCDs, and during the wettest times of the year, soils with high clay and silt fractions are most susceptible to the effects of handling during construction and the re-instatement of land; whereas soils with a high sand fraction in areas with the fewest number of FCDs and during the driest times of the year are the least susceptible.

4.4.13 Successful soil handling is dependent upon movements being undertaken under appropriate weather and ground conditions using the appropriate equipment. The principles of soil handling are well established and set out in advisory material such as Defra's Code of Practice for the Sustainable Use of Soils[37]. These principles would be followed throughout the construction period.

4.4.14 Clayey and seasonally waterlogged soils (including those of the Dale association) are least able to remain structurally stable if moved in wet conditions or by inappropriate equipment. They are susceptible to compaction and smearing, which could affect successful reinstatement.

4.4.15 Implementation of the measures set out in the draft CoCP would reduce the magnitude of impact on soil. The detailed soil survey data will define the sensitivity of soil, and the assessment of the effects on soils to be disturbed will be reported in the formal ES.

### Impacts on holdings

4.4.16 Land may be required for the Proposed Scheme from holdings temporarily, during the construction period, or permanently. In most cases, the temporary and permanent land requirement would occur simultaneously at the start of the construction period and it is the combined effect of both that would have the most impact on the holding. During the construction period, some agricultural land would be restored and the impact on individual holdings would reduce.

4.4.17 The effects of the Proposed Scheme on individual agricultural and related interests during the construction period will be reported in the formal ES. The formal ES will present the total area of land required on a particular holding during the construction period in absolute terms and as a percentage of the total area farmed. It will also show the area of land that would be returned to the holding following the construction

[37] Defra (2009), *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites*

period. The disruptive effects, principally of construction noise and dust, will be reported in the formal ES and assessed according to their effects on land uses and enterprises.

4.4.18 The potential temporary effects from the construction of the Proposed Scheme on individual agricultural and related interests are summarised in Table 6 for those holdings currently identified. The scale of the impact of land required to construct the Proposed Scheme is based on the likely proportion of land required from the holding during construction. The effects of severance will be judged on the ease and availability of access to severed land. With the implementation of the measures set out in the draft CoCP, these would generally be the same during and post construction.

4.4.19 The potential scale of effect is determined by combining the highest impact on the farm holding with the sensitivity of that holding, as set out in the SMR.

Table 6: Summary of temporary effects on holdings from construction

| **Holding name/sensitivity to change** | **Land potentially required** | **Potential severance impact** | **Potential scale of effect** |
|---|---|---|---|
| Land east of Silverhill Trail (north)<br><br>Low sensitivity | Medium | Negligible | Minor adverse |
| Land east of Silverhill Trail (south)<br><br>Low sensitivity | High | Negligible | Moderate adverse |
| Land west of Silverhill Trail<br><br>Low sensitivity | High | Negligible | Moderate adverse |
| Ashmore Farm<br><br>Medium sensitivity | Medium | Negligible | Moderate adverse |
| Land east of Alfreton Road<br><br>Low sensitivity | High | Negligible | Moderate adverse |
| Land west of Alfreton Road (north)<br><br>Low sensitivity | High | Negligible | Moderate adverse |
| Land west of Alfreton Road (south)<br><br>Low sensitivity | High | Negligible | Moderate adverse |
| Land east of Love Lane<br><br>Medium sensitivity | High | High | Major/moderate adverse |
| Doehill House Farm<br><br>Medium sensitivity | High | Medium | Major/moderate adverse |
| Land east of Morton | High | Negligible | Major/moderate adverse |

| Holding name/sensitivity to change | Land potentially required | Potential severance impact | Potential scale of effect |
|---|---|---|---|
| Medium sensitivity | | | |
| Land north of Doe Hill Lane<br>Medium sensitivity | High | Negligible | Major/moderate adverse |
| Morton Lodge Farm<br>Medium sensitivity | Medium | Negligible | Moderate adverse |
| Hagg House Farm<br>Medium sensitivity | Low | Negligible | Minor adverse |
| Land north of Morton<br>Medium sensitivity | Medium | Negligible | Moderate adverse |
| Padleywood Farm<br>Medium sensitivity | Negligible | Negligible | Negligible |
| Land south of Danesmoor<br>Medium sensitivity | Medium | Negligible | Moderate adverse |
| Land west of Pilsley<br>Medium sensitivity | Medium | Negligible | Moderate adverse |
| Land at Hagg Hill<br>Medium sensitivity | Medium | Negligible | Moderate adverse |

4.4.20 Overall, the construction of the Proposed Scheme could temporarily affect 18 holdings in the Stonebroom to Clay Cross area. On the basis of information currently available, 15 holdings could experience moderate or major/moderate adverse temporary effects from construction, which would be significant for each holding.

4.4.21 Four farm holdings are currently anticipated to experience major/moderate adverse temporary effects from construction. Three of these are livestock/grassland enterprises, and the fourth is a commercial equestrian holding. All have a medium sensitivity to change and would experience a high proportion of land required for construction of the Proposed Scheme. The holding 'Land east of Love Lane' would also experience a high severance impact.

4.4.22 A further 11 holdings would experience moderate adverse temporary effects. These are either low sensitivity small holdings, which would experience a high proportion of land required for construction of the Proposed Scheme, or moderate sensitivity commercial holdings experiencing medium impacts.

4.4.23 Although financial compensation would be available under existing statutory arrangements to offset these impacts, it is not a consideration in the assessment of effects on farm holdings.

### *Permanent effects of construction*

#### Impacts on agricultural land

4.4.24 Interpretation of publicly available data shows that the Proposed Scheme is likely to require approximately 17ha of agricultural land permanently within the Stonebroom to Clay Cross area, of which approximately 4ha (24%) are likely to be classified as BMV land (predominantly of Subgrade 3a). This is a low magnitude of impact on BMV land.

4.4.25 As BMV land in this local area is a receptor of high sensitivity, it is currently anticipated that the likely effect of the Proposed Scheme on BMV land following construction would be moderate adverse, which would be significant.

#### Impacts on forestry land

4.4.26 It is currently not known if any areas of commercial forestry land would be required for the Proposed Scheme in this study area.

#### Impacts on holdings

4.4.27 The potential permanent effects from the construction of the Proposed Scheme on individual agricultural and related interests are summarised in Table 7 for those holdings currently identified. The scale of the impact of land required to operate the Proposed Scheme is based on the likely proportion of land required from the holding. The potential effects of severance are judged on the ease and availability of access to severed land once construction is completed. The impact on farm infrastructure refers mainly to the potential loss of or damage to farm capital, such as property, buildings and structures, and the consequential effects on land uses and enterprises.

4.4.28 The potential scale of effect is determined by combining the highest impact on the farm holding with the sensitivity of that holding, as set out in the SMR.

Table 7: Summary of permanent effects on holdings from construction

| Holding name/ Sensitivity to change | Land potentially required | Potential severance impact | Potential impact on farm infrastructure | Potential scale of effect |
|---|---|---|---|---|
| Land east of Silverhill Trail (north)<br><br>Low sensitivity | Medium | Negligible | Negligible | Minor adverse |
| Land east of Silverhill Trail (south)<br><br>Low sensitivity | High | Negligible | Negligible | Moderate adverse |
| Land west of Silverhill Trail<br><br>Low sensitivity | High | Negligible | Negligible | Moderate adverse |
| Ashmore Farm<br><br>Medium sensitivity | Medium | Negligible | Negligible | Moderate adverse |
| Land east of Alfreton Road<br><br>Low sensitivity | High | Negligible | Negligible | Moderate adverse |

| Holding name/ Sensitivity to change | Land potentially required | Potential severance impact | Potential impact on farm infrastructure | Potential scale of effect |
|---|---|---|---|---|
| Land west of Alfreton Road (north)<br>Low sensitivity | High | Negligible | High | Moderate adverse |
| Land west of Alfreton Road (south)<br>Low sensitivity | Negligible | Negligible | Negligible | Negligible |
| Land east of Love Lane<br>Medium sensitivity | Medium | High | Negligible | Major/moderate adverse |
| Doehill House Farm<br>Medium sensitivity | Negligible | Negligible | Negligible | Negligible |
| Land east of Morton<br>Medium sensitivity | High | Negligible | Negligible | Major/moderate adverse |
| Land north of Doe Hill Lane<br>Medium sensitivity | Negligible | Negligible | Negligible | Negligible |
| Morton Lodge Farm<br>Medium sensitivity | Negligible | Negligible | Negligible | Negligible |
| Hagg House Farm<br>Medium sensitivity | Negligible | Negligible | Negligible | Negligible |
| Land north of Morton<br>Medium sensitivity | Negligible | Negligible | Negligible | Negligible |
| Padleywood Farm<br>Medium sensitivity | Negligible | Negligible | Negligible | Negligible |
| Land south of Danesmoor<br>Medium sensitivity | Medium | Negligible | Negligible | Moderate adverse |
| Land west of Pilsley<br>Medium sensitivity | Negligible | Negligible | Negligible | Negligible |
| Land at Hagg Hill<br>Medium sensitivity | Negligible | Negligible | Negligible | Negligible |

4.4.29 Overall, the construction of the Proposed Scheme could permanently affect 11 holdings in the Stonebroom to Clay Cross area. Seven holdings at Doehill House Farm, land north of Doe Hill Lane, land west of Alfreton Road (south), land north of Morton, land west of Pilsley, land at Hagg Hill and Padleywood Farm would not experience any permanent effects from construction.

4.4.30 On the basis of information currently available, eight holdings could experience moderate or major/moderate adverse permanent effects from construction, which would be significant for each holding.

4.4.31 Two farm holdings are currently anticipated to experience major/moderate adverse permanent effects from construction. Land at Love Lane would continue to have a high severance impact, and land east of Morton would have a high proportion of the holding required permanently for the Proposed Scheme.

4.4.32 Six holdings would experience moderate adverse permanent effects. These continue to be either low sensitivity small holdings, which would experience a high proportion of land required, or moderate sensitivity commercial holdings with medium land required impacts. Land west of Alfreton Road (north) would also experience a high infrastructure impact due to the demolition of stable buildings.

4.4.33 Although financial compensation will be available under existing statutory arrangements, there can be no certainty that this would be used to reduce the above adverse effects by the purchase of replacement land or the construction of replacement buildings. Therefore, the above assessment should be seen as the worst case, which could be reduced if the owner and/or occupier is able, and chooses, to use compensation payments to replace assets.

### Other mitigation measures

4.4.34 Soils and their associated seed banks from the ancient woodlands would be stored separately and utilised in species translocation.

4.4.35 Other mitigation would incorporate climate change adaptation and resilience measures, insofar as reasonably practicable. For example, restored soils in areas that could be prone to drought with climate change could potentially be replaced at greater depths than at present to make them resilient to drought.

4.4.36 A farm pack within the Phase 2b Farmers and Growers Guide would be provided to all farmers and landowners, setting out baseline conditions on the farm and the assurances and obligations that HS2 Ltd would accept upon entering the land. This would include advice and appropriate assistance where there is a need for the landowner to relocate or re-provide agricultural buildings displaced by the Proposed Scheme.

### Summary of likely residual significant effects

4.4.37 Although the extent of land required permanently, broken down by ALC grade is not yet known in the Stonebroom to Clay Cross area, current indications based on publicly available information are that the effect on BMV agricultural land would be moderate adverse, both temporarily and permanently, during and following construction, which would be significant. The amount of land required by ALC grade will be assessed and reported in the formal ES.

4.4.38 Fifteen of the 18 farm holdings identified are anticipated to experience moderate or major/moderate adverse temporary effects during construction; with eight anticipated to experience moderate or major/moderate adverse permanent effects, which would be significant for each holding.

4.4.39 Effects on forestry land and soils to be disturbed will reported in the formal ES.

## 4.5 Effects arising from operation

### Avoidance and mitigation measures

4.5.1 No measures are currently anticipated to be required to mitigate the operational effects of the Proposed Scheme on agriculture, forestry and soils.

### Assessment of impacts and effects

4.5.2 Potential impacts arising from the operation of the Proposed Scheme would include:

- noise emanating from moving trains; and
- the propensity of operational land to harbour noxious weeds.

4.5.3 One set of farm buildings at Doehill House Farm lies within approximately 100m of the route of the Proposed Scheme. The potential for significant effects on sensitive livestock receptors from noise will be assessed and reported in the formal ES.

4.5.4 The propensity of linear transport infrastructure to harbour and spread noxious weeds is a consequence of:

- the management of the highway and railway land; and
- the propensity of the weeds to spread onto such land from adjoining land, which could be exacerbated by the effects of climate change.

4.5.5 The presence of noxious weeds (particularly ragwort) would be controlled using an appropriate management regime that identifies and remedies areas of weed growth that might threaten adjoining agricultural interests.

### Other mitigation measures

4.5.6 No other mitigation measures have been identified at this stage.

### Summary of likely residual significant effects

4.5.7 No residual significant effects on agriculture, forestry and soils have been identified at this stage as a result of the operation of the Proposed Scheme.

### Monitoring

4.5.8 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme.

4.5.9 There are no area-specific requirements identified for monitoring agriculture, forestry and soil during the operation of the Proposed Scheme in the Stonebroom to Clay Cross area.

# 5 Air quality

## 5.1 Introduction

5.1.1 This section of the report provides an assessment of the impacts and likely significant effects on air quality identified to date arising from the construction and operation of the Proposed Scheme within the Stonebroom to Clay Cross area. Oxides of nitrogen (NOx) including nitrogen dioxide (NO2), fine particulate matter[38] (PM10, PM2.5) and dust have been considered in the assessment. Emissions of all or some of these air pollutants are likely to arise from construction activities, demolition, site preparation works and the use of site haul routes. Emissions would also arise from road traffic during construction and operation of the Proposed Scheme.

5.1.2 Engagement with Bolsover District Council (BDC) and North East Derbyshire District Council (NEDDC) has been undertaken. The purpose of this engagement has been to obtain relevant baseline information, which includes monitoring data in this area.

5.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme are provided in the Volume 2: LA09 Map Book.

## 5.2 Scope, assumptions and limitations

5.2.1 The scope, assumptions and limitations for the air quality assessment are set out in Volume 1 and the Scoping and Methodology Report (SMR)[39].

5.2.2 The study areas for the air quality assessment have been determined on the basis of where impacts on local air quality may occur[40]:

- from construction;
- from changes in the nature of traffic during construction and operation; for example, increases in traffic flows during construction or where road closures or restrictions cause diversions and heavier traffic on adjacent roads;
- where road alignments have changed; or,
- from the operation of combustion plant at buildings.

5.2.3 The assessment of construction traffic will be reported in the formal ES. The assessment will incorporate HS2 Ltd's policies on vehicle emissions. These include the use of Euro VI heavy goods vehicles (HGVs), Euro 4 petrol and Euro 6 diesel cars and light goods vehicles (LGVs) during construction of the Proposed Scheme.

5.2.4 The assessment of construction traffic impacts will use traffic data based on an estimate of the average daily flows in the peak year during the construction period

[38] PM2.5 and PM10 describe two size fractions of airborne particles that can be inhaled and therefore are of concern for human health. The designations refer to particles of size less than 2.5 and 10 microns in diameter.
[39] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report
[40] The assessment of construction dust emissions has been undertaken where sensitive receptors are located up to a distance of 350m from dust generating activities. The assessment of traffic emissions will be undertaken where sensitive receptors are located up to a distance of 200m from roads screened in for further assessment.

(2023-2032). The assessment will assume vehicle emission rates and background pollutant concentrations from year 2023. As both pollutant emissions from vehicle exhausts and background pollutant concentrations are anticipated to reduce year by year as a result of vehicle emission controls, the year 2023 represents the worst case for the construction assessment.

## 5.3 Environmental baseline

### Existing baseline

#### *Background air quality*

5.3.1 The main sources of air pollution in the Stonebroom to Clay Cross area are emissions from road vehicles and agricultural activities. The main roads within the area are the A61 Stretton Road/High Street, the A6175 Market Street, the B6025 Alfreton Road and the B6014 Doe Hill Lane/Station Road/Main Road/Stretton Road/Morton Road.

5.3.2 There is one industrial installation (regulated by the Environment Agency) with permits for emissions to air, namely Clay Cross Energy Recovery Facility. The contribution of all industrial processes and other emission sources to local air quality are existing, and therefore are included within the background concentrations.

5.3.3 Estimates of background air quality have been obtained from the Department for Environment, Food and Rural Affairs (Defra)[41], for the baseline year of 2017. The data are estimated for 1km grid squares for NOx, NO2, PM10 and PM2.5. Background concentrations are within the air quality standards for all pollutants within the Stonebroom to Clay Cross area.

#### *Local monitoring data*

5.3.4 There are currently two local authority diffusion tube sites located within the Stonebroom to Clay Cross area for monitoring NO2 concentrations. Measured concentrations in 2016 were within the air quality standard at both locations[42].

#### *Air quality management areas*

5.3.5 There are no air quality management areas (AQMAs) within the Stonebroom to Clay Cross area.

#### *Receptors*

5.3.6 Several locations have been identified in the area as sensitive receptors, where they are considered to be susceptible to changes in air quality due to their proximity to dust generating activities or traffic routes during construction or operation of the Proposed Scheme.

5.3.7 Most of the receptors which may be affected by the Proposed Scheme are residential, located within Tibshelf, Stonebroom, Morton and Danesmoor. Other receptors include Morton Primary School and Tibshelf Community School.

[41] Department for Environment, Food and Rural Affairs (Defra) Defra Background Pollutant Concentration Maps; https://uk-air.defra.gov.uk/data/laqm-background-home
[42] At the time of assessment, measurements for 2016 were the latest published annual monitoring baseline data

5.3.8 There are no statutory designated ecological sites identified within the Stonebroom to Clay Cross area. Non-statutory sensitive ecological sites identified close to the Proposed Scheme are Padley Wood Ancient Woodland Inventory Site (AWIS) (which sits within the larger Padley Wood Local Wildlife Site (LWS)), and eight additional LWS namely, Newton Disused Railway LWS, The Water Meadow LWS, Station House Grassland LWS, Station Road Morton LWS, Morton Colliery LWS, Morton Railway LWS, Padley Wood Poultry Farm LWS and Cavell Drive Meadow LWS. Further details of the ecological receptors are set out in Section 7, Ecology and biodiversity.

## 5.4 Effects arising during construction

### Avoidance and mitigation measures

5.4.1 Emissions to the atmosphere will be controlled and managed during construction through the route-wide implementation of the Code of Construction Practice (CoCP)[43]. The draft CoCP includes a range of mitigation measures that are accepted by the Institute of Air Quality Management (IAQM) as being suitable to reduce impacts to as low a level as is reasonably practicable. These measures are generally sufficient to avoid any significant effects from dust during construction.

5.4.2 The assessment has assumed that the general measures detailed in Section 7 of the draft CoCP will be implemented. These include:

- contractors being required to manage dust, air pollution, odour and exhaust emissions during construction works;
- inspection and visual monitoring, undertaken in consultation with the local authorities, to assess the effectiveness of the measures taken to control dust and air pollutant emissions;
- cleaning (including watering) of vehicle routes and designated vehicle waiting areas to suppress dust;
- the use of water spray systems on demolition sites to dampen down fugitive dust;
- keeping soil stockpiles away from sensitive receptors where reasonably practicable, also taking into account the prevailing wind direction relative to sensitive receptors;
- the use of enclosures to contain dust emitted from construction activities; and
- soil spreading, seeding and planting of completed earthworks as soon as reasonably practicable following completion.

5.4.3 The draft CoCP includes the requirement for site-specific traffic management measures, such as the use of site haul routes for construction vehicles to minimise the need to use public roads.

[43] Supporting documents: Draft Code of Construction Practice

## Assessment of impacts and effects

### *Temporary effects*

5.4.4 Impacts from construction of the Proposed Scheme could arise from dust generating activities and emissions from construction traffic. As such, the assessment of construction impacts has been undertaken for dust and exposure to NO2, PM10 and PM2.5 concentrations.

#### Construction dust effects

5.4.5 The risks of demolition of existing buildings, earthworks, construction of new structures and trackout[44], have been assessed for their effect on dust soiling, human health[45] and ecological sites. There are residential and ecological receptors located within the Stonebroom to Clay Cross area.

5.4.6 It has been identified that there would be a low risk of dust and human health effects from demolition activities. For earthworks, there would be a low to medium risk of dust effects and a low risk of human health effects. For construction activities, there would be a low to medium risk of dust effects and a low risk of human health effects. For trackout, there would be a high risk of dust effects and a low to medium risk of human health effects. There would also be a low to medium risk of ecological effects from all dust generating activities.

5.4.7 With the application of the established national best practice mitigation measures contained in the draft CoCP, no significant effects are anticipated from dust generating activities.

#### Construction traffic effects

5.4.8 Construction activity could also affect local air quality through the additional traffic generated on local roads as a result of construction vehicles and through changes to traffic patterns arising from temporary road diversions and realignments.

5.4.9 The A61 Stretton Road/High Street, the A6175 Market Street, the B6025 Alfreton Road and the B6014 Doe Hill Lane/Station Road/Main Road/Stretton Road/Morton Road, Love Lane, Stonebroom Lane, Newton Road, Evershill Lane, Pilsley Road (south of Pilsley), Morton Road, Pewit Lane, Station Road, Hardstoft Road, Lime Tree Grove, Beech Way, Cemetery Road, Pilsley Road (Danesmoor), Coney Green Road, Harris Way, Bridge Street and Furnace Hill Road would likely provide the primary access for construction vehicles in this area. An increase in traffic flows as a result of construction traffic is anticipated on these the roads. Temporary closures and diversions or realignments are anticipated on the B6025 Alfreton Road, the B6014 Doe Hill Lane/Station Road, Stonebroom Lane and Pilsley Road (south of Pilsley). A detailed assessment of air quality impacts from traffic emissions in the area will be undertaken and reported in the formal ES.

5.4.10 Direct and indirect effects from changes in air quality, such as those arising from increased levels of construction traffic, will be considered for all sensitive receptors

[44] Trackout refers to the transport of dust and dirt from the construction site(s) onto the public road network, where it may be deposited and then re-suspended by vehicles using the network
[45] Human health effects relate mainly to short-term exposure to particles of size between 2.5µm to 10µm, measured as PM10

within 200m of construction routes. These will include sensitive receptors and ecological habitats considered to be sensitive to changes in local air quality. The effects will be reported in the formal ES

#### *Permanent effects*

5.4.11 No permanent effects on local air quality would be likely to arise during construction of the Proposed Scheme.

### Other mitigation measures

5.4.12 No other mitigation measures are proposed at this stage in relation to air quality during construction of the Proposed Scheme in this area.

### Summary of likely residual significant effects

5.4.13 The methods outlined within the draft CoCP are considered effective at reducing dust emissions and, therefore, no significant residual effects would be anticipated. Any significant residual effects from construction traffic emissions will be reported in the formal ES.

## 5.5 Effects arising from operation

### Avoidance and mitigation measures

5.5.1 No specific mitigation measures for air quality would be proposed during operation of the Proposed Scheme.

### Assessment of impacts and effects

5.5.2 Impacts from the operation of the Proposed Scheme would arise from changes in the volume, composition and/or speed of road traffic and changes in road alignment.

5.5.3 There would be no direct atmospheric emissions from the operation of trains that would cause an impact on air quality, and therefore no assessment is required. Indirect emissions from sources such as rail wear and brakes have been assumed to be negligible.

#### Operational traffic effects

5.5.4 Direct and indirect effects from changes in air quality, such as that arising from increased levels of traffic, will be considered for all receptors within 200m of affected roads. These will include human receptors and those ecological habitats considered to be sensitive to changes in air quality. Any effects will be reported in the formal ES.

### Other mitigation measures

5.5.5 No other mitigation measures are proposed at this stage in relation to air quality in this area during operation of the Proposed Scheme.

### Summary of likely residual significant effects

5.5.6 Any significant residual effects for air quality from the operation of the Proposed Scheme will be reported in the formal ES.

## Monitoring

5.5.7 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme.

5.5.8 Any area specific requirements for monitoring air quality effects during operation of the Proposed Scheme in this area will be reported in the formal ES.

# 6 Community

## 6.1 Introduction

6.1.1 This section of the report describes the impacts and likely significant effects identified to date on local communities resulting from the construction and operation of the Proposed Scheme in the Stonebroom to Clay Cross area.

6.1.2 The assessment draws on information gathered from engagement with the users and operators of community facilities including Derbyshire County Council (DCC), North East Derbyshire District Council (NEDDC), Bolsover District Council (BDC), Derbyshire Local Access Forum, Clay Cross Parish Council, Pilsley Parish Council, Tibshelf Parish Council, Doe Hill Community Park Community Group, HS2 Blackwell Group and Doe Hill Community Park (Banks Group). The purpose of this engagement has been to understand how the facilities are used and to obtain relevant baseline information and inform the design development of the Proposed Scheme. Engagement will continue with these and other stakeholders to inform the formal ES.

6.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2: LA09 Map Book.

## 6.2 Scope, assumptions and limitations

6.2.1 The assessment scope, key assumptions and limitations for the community assessment are set out in Volume 1, Section 8 and the Scope and Methodology Report (SMR)[46].

6.2.2 The assessment of in-combination effects will draw upon the findings of other technical disciplines (e.g. air quality, sound, noise and vibration, landscape and visual and traffic and transport). Likely significant in-combination effects on community facilities and resources will be reported in the formal ES.

6.2.3 Effects relating to the severance of public rights of way (PRoW) and highway and pedestrian diversions, are assessed under the Traffic and transport topic. However, where PRoW and other routes are a 'promoted' destination in their own right as a recreation resource, they will be considered within the community assessment. Where impacts on open space and PRoW are considered, these have been informed by open space and PRoW condition surveys, where it has been possible to undertake such surveys.

6.2.4 Where reasonably practicable, public footpaths and routes would be reinstated or convenient alternatives provided. HS2 Ltd will seek to provide a temporary or permanent alternative route in advance of a closure of a road or PRoW. No significant effects on these routes are likely once the mitigation measures have been implemented. Alternative temporary routes have not been defined in all cases due to

[46] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

the relatively early stage of design of the Proposed Scheme. Where this is the case they will be reported in the formal ES.

6.2.5 If a temporary or permanent alternative route cannot be provided in advance of any road or PRoW closure, then this will be discussed with the relevant local authority and local groups and reported in the formal ES.

6.2.6 The assessment in the working draft ES is based on the design information, including demolitions as set out in Section 2 available at the time of the assessment. This is subject to change as a result of design changes confirmed in advance of the submission of the hybrid Bill.

6.2.7 The construction of the Proposed Scheme could lead to isolation effects in one or more communities in this area. These will be assessed in the formal ES.

6.2.8 Overall, the study area is taken as the area of land that encompasses the likely significant effects of the Proposed Scheme. The study area includes the area of land required both temporarily and permanently for the construction and operation of the Proposed Scheme. It also includes a wider corridor within which receptors or resources could be affected by a combination of significant residual effects arising from, for example, noise, vibration, poor air quality, HGV traffic and visual intrusion. These in-combination effects will be identified in the formal ES. In addition, the study area has regard to the proposed routes of construction traffic and takes account of catchment areas for community facilities that could be affected where intersected by the Proposed Scheme.

6.2.9 For the working draft ES, the full details of the construction traffic routes and geographical scope of likely in-combination (amenity) effects are yet to be determined. In the formal ES, the study area and associated baseline of community resources will be updated to take account of these.

6.2.10 At this stage it has not been possible to complete surveys of public open spaces in this area; therefore, for the working draft ES an assumption has been made about the level of sensitivity on a case by case basis. This will be adjusted, as appropriate, on the basis of survey results to inform the formal ES.

## 6.3 Environmental baseline

6.3.1 The route of the Proposed Scheme through the Stonebroom to Clay Cross area would be approximately 5.2km in length and lie within the BDC and NEDDC areas. It would extend from the west of Newton, passing close to Tibshelf, and would join the corridor of the existing Erewash Valley Line, which is in proximity to Stonebroom, Morton, Pilsley and Clay Cross.

6.3.2 The area is predominantly semi-rural in nature. The main concentration of local services and community facilities is located in Clay Cross. Tibshelf, Newton, Morton, Stonebroom, and Pilsley are other settlements and villages located within the study area close to the route of the Proposed Scheme, which also provide some local services. Outside of the main settlements, the area is characterised by small clusters of dwellings, and individual dwellings within rural areas close to the route of the Proposed Scheme.

## Tibshelf

6.3.3 The village of Tibshelf is located partially within the study area. Tibshelf is located north of Newton and Blackwell, and west of the M1. The village comprises approximately 1,600 residential properties. Some residential properties in Tibshelf would be on the route of the Proposed Scheme. Notable community facilities within the study area include Tibshelf ponds and part of the Five Pits Trail, Tibshelf Town End junior school, Tibshelf infant and nursery school, Shetland Road recreation ground, Tibshelf village hall, Heathfield Gardens care facility, St John the Baptist parish church, a post office, Tibshelf allotment garden, two cemeteries, and one public house and hotel (King Edward VII Hotel).

6.3.4 Doe Hill Community Park is located between Tibshelf and Stonebroom. The former colliery site is accessed from Doe Hill Lane to the north, and Love Lane to the south-west. The park contains a pond and a network of footpaths and cycling routes, which provide connections to the Silverhill Trail via Love Lane. More widely, connections can be made from Silverhill Trail to the Five Pits Trail which is a popular recreational promoted PRoW and one of the trails that make up the Phoenix Greenways.

6.3.5 The Silverhill Trail is one of the trails that makes up the Phoenix Greenways, a network of promoted PRoW. National Cycle Network Route 67 also follows part of the Silverhill Trail. The trail in this area uses the track of a disused mineral railway line and runs from south to north to the west of Newton, before turning east and passing between the villages of Tibshelf and Newton. It provides onward links to the Five Pits Trail, and also to the Pleasley Trail network in Nottinghamshire. The Silverhill Trail provides opportunities for walking, cycling and horse riding and has easy access for wheelchairs and mobility scooters.

## Stonebroom and Morton

6.3.6 Stonebroom and Morton are villages located partially within the study area. Both settlements are located predominantly to the west of the existing Erewash Valley Line, approximately 1.5km west of Tibshelf, and 3.5km south of Clay Cross. Stonebroom and Morton are predominantly residential. Stonebroom contains approximately 1,400 residential properties and Morton contains approximately 550 residential properties. The nearest residential property in Stonebroom would be located approximately 30m west of the route of the Proposed Scheme, while the nearest residential properties in Morton would be located approximately 70m west of the route of the Proposed Scheme.

6.3.7 Notable community facilities within Stonebroom include St. Peters Church, Stonebroom Methodist Church, Stonebroom Post Office and Stonebroom Nursery and Primary School. Notable community facilities in Morton include Ain Moor Wood and Padley Wood, Morton Grange nursing home and the Corner Pin public house/restaurant.

6.3.8 Ain Moor is an extensive woodland area that is located north-west of Morton and east of Stretton and is publicly accessible from a PRoW within the woodland. The existing Erewash Valley Line borders the woodland on part of the eastern boundary. It can be accessed from a PRoW on Morton Road. A network of public footpaths passes

through the woodland area connecting it to neighbouring settlements including Stonebroom, Stretton, Pilsley, Morton and Danesmoor.

6.3.9 Padley Wood is bordered on the west by the Erewash Valley Line and is located west of Pilsley village. A public footpath runs along the northern boundary and provides access to the woodland. The footpath connects to the nearby Ain Moor woodland and eastwards to Pilsley.

### Clay Cross

6.3.10 Clay Cross is a town partially within the study area and located approximately 7km south of Chesterfield. The town is bordered on the east by the existing Erewash Valley Line. There are approximately 4,300 residential properties in the town. The nearest residential properties would be located approximately 400m north-west of the route of the Proposed Scheme, where it would connect with the Erewash Valley Line. Clay Cross provides a number of local services and community facilities including: Guildford Lane allotment; Sharley Park Primary School; Danesmoor County Infant School; St. Barnabas Pre-school; St. Barnabas Community Centre; Chesterfield amateur boxing club; Jackson the Bakers eatery; and Clay Cross Police Station.

## 6.4 Effects arising during construction

### Avoidance and mitigation measures

6.4.1 As part of design development, the following mitigation and avoidance measures will be put into place: PRoW would be maintained and remain operational wherever reasonably practicable.

6.4.2 The draft Code of Construction Practice (CoCP)[47] includes a range of provisions that will help mitigate community effects associated with construction within this area, including:

- implementation of a community engagement framework to provide appropriate information and resolve community issues (Section 5 of the draft CoCP);
- sensitive layout of construction sites to reduce nuisance as far as possible (Section 5);
- maintenance of public rights of way (PRoW) during construction where reasonably practicable (Section 14);
- monitoring and management of flood risk and other extreme weather events, where reasonably practicable, which may affect community resources during construction (Section 16);
- specific measures in relation to air quality and noise will also serve to reduce impacts for the neighbouring communities including discretionary noise insulation for sensitive community resources and, in special circumstances,

[47] Supporting document: Draft Code of Construction Practice

temporary rehousing (Sections 7 and 13); and

- where practicable, the avoidance of HGVs operating adjacent to schools during drop off and pick up periods (Section 14).

## Assessment of impacts and effects

### *Temporary effects*

#### Residential properties

6.4.3 The realignment of Tibshelf Bridleway 5, south-east of its existing alignment to join the Silverhill Trail would require the temporary use of part of the common access drive of two residential properties on Newton Road in Tibshelf. The temporary loss of this outside space for a duration of approximately three months would not impact on the ability of the residents to use their dwellings. The access to the properties would be modified to tie-in with the realignment of Tibshelf Bridleway 5, however access to the properties would be maintained throughout construction. This is not considered to have a significant community effect.

6.4.4 Works to the B6014 Doe Hill Lane/Station Road to allow construction of the Doe Hill Lane underbridge and modifications to the vertical alignment of Doe Hill Lane to improve headroom, would temporarily require part of the garden of a residential property on Doe Hill Lane in Tibshelf for a duration of approximately one year. The temporary loss of this small area of land would not impact on the ability of the residents to use their dwellings and access would be maintained throughout construction. This is not considered to have a significant community effect.

6.4.5 Modifications to the vertical alignment of the B6014 Doe Hill Lane/Station Road to improve headroom and construction of the Stonebroom Lane realignment at its junction with Station Road, would temporarily require part of the gardens of one residential property on Stonebroom Lane, and two residential properties on Station Road. The temporary loss of these areas of land for a duration of approximately ten months, would not impact on the ability of residents to use their dwellings and access would be maintained throughout construction. This is not considered to have a significant community effect.

#### Community facilities

6.4.6 No temporary effects on community facilities have been identified as a result of the land required for construction of the Proposed Scheme.

#### Recreational facilities

6.4.7 No temporary effects on recreational facilities have been identified as a result of the land required for construction of the Proposed Scheme.

#### Open space and recreational PRoW

6.4.8 Between Alfreton Road and Gloves Lane, a section (approximately 500m) of the promoted PRoW Silverhill Trail would be within land required for the construction of the Blackwell North embankment. During the construction period, this section of the trail would be temporarily diverted along Tibshelf Bridleway 5, and the footpath would remain open and accessible throughout construction. The Tibshelf Bridleway 5

accommodation underbridge would maintain connectivity following construction. The temporary diversion of part of the trail for a duration of approximately one year would result in a minor adverse community effect, which would not be significant.

6.4.9 The construction of the Stonebroom cutting and Stonebroom embankment would temporarily require approximately 35% of the land within the Doe Hill Community Park. The remaining open space would remain open and accessible throughout construction, and the area required temporarily would be restored following construction. Doe Hill Community Park is a regularly used and valued resource in the local community. Overall, the park is of good quality and is well maintained. It includes signage, car parking, seating, and litter bins and is used for walking, dog walking and horse riding. The temporary loss of part of the open space for a duration of approximately two years and three months would result in a major adverse effect, which would be significant.

6.4.10 The construction of a drainage ditch, west of Morton cutting, would require land on the boundary Ain Moor Wood for a duration of one year. The temporary loss of this small area of land would not affect the existing use of the open space. This would result in a negligible effect, which would not be significant.

6.4.11 The construction of the Morton cutting would require approximately 1% of land within Padley Wood. The majority of the open space would remain open and accessible throughout construction. The temporary use of this part of the open space would result in a minor adverse community effect, which would not be significant.

### *Permanent effects*

#### Residential properties

6.4.12 Stonebroom embankment and associated works would require the demolition of two residential properties on Doe Hill Lane, Tibshelf and two residential properties on Stonebroom Lane, Stonebroom. These residential properties would be permanently lost.

#### Community facilities

6.4.13 No permanent effects on community facilities have been identified as a result of the land required for construction of the Proposed Scheme.

#### Recreational facilities

6.4.14 No permanent effects on recreational facilities have been identified as a result of the land required for construction of the Proposed Scheme.

#### Open space and recreational PRoW

6.4.15 The construction of the Stonebroom cutting and Stonebroom embankment would require approximately 25% of land within the Doe Hill Community Park. The cutting and embankment would cross the existing circular/figure-of-eight paths within the park in two places, and sever the park into two parts. A footpath overbridge would be provided to link the two sections of the park. The permanent loss of part of the open space at this location would result in a major adverse effect, which would be significant.

6.4.16 The construction of the Morton cutting would permanently require approximately 1% of land within Padley Wood. The permanent loss of this part of the open space would result in a minor adverse effect which would not be significant.

### Other mitigation measures

6.4.17 HS2 Ltd will continue to engage with owners/operators to identify reasonably practicable measures to help mitigate potential significant effects identified in this assessment.

6.4.18 Any other mitigation measures will be described in the formal ES.

### Summary of likely residual significant effects

6.4.19 Land required for the construction of the Proposed Scheme is likely to result in temporary and permanent residual significant adverse effects at Doe Hill Community Park.

### Cumulative effects

6.4.20 Community wide effects occur where a number of individual impacts on resources come together within a location and have a wider impact on the community, such that they change the experience of a considerable proportion of people within that community.

6.4.21 No cumulative effects have been identified at this time. Any combined effects on a community during construction of the Proposed Scheme, which would result in cumulative community effects, will be reported in the formal ES.

## 6.5 Effects arising from operation

### Avoidance and mitigation measures

6.5.1 Avoidance and mitigation measures will be reported in the formal ES.

### Assessment of impacts and effects

6.5.2 Operation of the Proposed Scheme could lead to in-combination effects on the community in this area which will be reported in the formal ES.

### Other mitigation measures

6.5.3 Any other mitigation measures will be described in the formal ES.

### Summary of likely residual significant effects

6.5.4 A summary of the likely residual significant effects will be reported in the formal ES.

### Cumulative effects

6.5.5 Community wide effects occur where a number of individual impacts on resources come together within a location and have a wider impact on the community, such that they change the experience of a considerable proportion of people within that community.

6.5.6 No cumulative effects have been identified at this time. Any combined effects on a community during construction of the Proposed Scheme, which would result in cumulative community effects, will be reported in the formal ES

## Monitoring

6.5.7 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme.

6.5.8 There are no area-specific community monitoring requirements during operation of the Proposed Scheme. Any area-specific operational monitoring requirements in relation to air quality effects, noise and vibration effects, traffic effects and visual effects that would contribute to the in-combination assessments, will be described in the relevant topic sections of the formal ES.

# 7 Ecology and biodiversity

## 7.1 Introduction

7.1.1 This section of the report identifies the predicted impacts and likely significant effects on species and habitats identified to date in Stonebroom to Clay Cross area as a consequence of the construction and operation of the Proposed Scheme. This includes effects on sites recognised or designated on the basis of their importance for nature conservation.

7.1.2 Engagement with stakeholders including, Natural England, Forestry Commission, Derbyshire County Council (DCC) and Derbyshire Wildlife Trust has commenced and is ongoing. The purpose of this engagement has been to discuss the Proposed Scheme and potential effects, obtain relevant baseline information and consider alternative locations for environmental mitigation. Engagement with these stakeholders and other local groups will continue as part of the development of the Proposed Scheme and inform the formal ES.

7.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme are provided in the Volume 2: LA09 Map Book.

7.1.4 All distances and area measurements in this section are approximate.

## 7.2 Scope, assumptions and limitations

7.2.1 The scope, assumptions and limitations for the ecological assessment are set out in Volume 1, Section 8 and the Scope and Methodology Report (SMR)[48].

7.2.2 In the absence of field surveys and fully developed mitigation, the assessment has been undertaken on a realistic precautionary approach.

7.2.3 Field surveys are ongoing, but are limited to locations where landowner permission has been obtained and to areas accessible to the public. The surveys include (but are not limited to) broad habitat and detailed plant surveys, great crested newt surveys, wintering and breeding bird surveys, bat surveys, otter and water vole surveys. The findings from these ongoing surveys will be taken into account in the formal ES.

## 7.3 Environmental baseline

### Existing baseline

#### *Introduction*

7.3.1 This section describes the ecological baseline relevant to the assessment: the designated sites, habitats and species recorded in this area as known at this time.

7.3.2 Land required for the construction of, and adjacent to, the Proposed Scheme in this area consists mainly of agricultural land, woodland, floodplain, scrub and industrial areas. The route of the Proposed Scheme in the Stonebroom to Clay Cross area would

[48] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

pass through gently undulating topography and areas of woodland, including at Doe Hill Community Park. The route of the Proposed Scheme would run parallel to the existing Erewash Valley Line over much of its length, including where it would cross the River Rother.

7.3.3 Statutory and non-statutory designated sites are shown on Map Series CT-10, Volume 2: LA09 Map Book.

### *Designated sites*

7.3.4 There are no statutory designated sites that are relevant to the assessment of the Proposed Scheme in the Stonebroom to Clay Cross area.

7.3.5 There are 11 Local Wildlife Sites (LWS) of potential relevance to the assessment in the Stonebroom to Clay Cross area, each of which is of county/metropolitan value. Citations provided by relevant organisations have been used in the descriptions below, and where citations are outstanding, publicly available sources of information have been used. Details of site interest features and reasons for designation will be updated in the formal ES. The LWS are:

- Tibshelf Sidings LWS, covering an area of 7.7ha, is designated for the presence of unimproved neutral grassland, which has a good species diversity; and a mosaic of scrub, bare ground and secondary woodland. It provides a range of habitats for wildlife. The site is considered to have particular value for invertebrates and is located 735m south-west from land required for the Proposed Scheme;
- Newton Disused Railway LWS, covering an area of 7.3ha, is designated because it supports a mix of grassland, ruderal, scrub and woodland vegetation communities. The site is also important as a green corridor for wildlife in the area and links to several other areas of semi-natural habitat. This site is located partially within the land required for the Proposed Scheme;
- The Water Meadow LWS, covering an area of 2.8ha, is designated because it supports species rich neutral grassland. A total of 43 plant species have been recorded within the LWS including purple orchid and southern marsh orchid. Small heath butterfly was found on site in 2007. This site lies immediately adjacent to the land required for the Proposed Scheme;
- Station House Grassland LWS, covering an area of 3.6ha, is designated because it supports a mosaic of vegetation communities including unimproved neutral grassland, scrub, and immature woodland. There are also pockets of marshy habitat in the wetter areas. This site is located partially within the land required for the Proposed Scheme;
- Station Road, Morton LWS, covering an area of 2.8ha, is designated for the presence of lowland mire. The site is located partially within the land required for the Proposed Scheme;
- Morton Railway LWS, covering an area of 3.5 ha, is designated for the presence of wet semi-natural grassland. The site is located partially within the land required for the Proposed Scheme;

- Morton Colliery LWS, covering an area of 10ha, is designated for the presence of a habitat mosaic including deciduous woodland. This site is located partially within the land required for the Proposed Scheme;
- Padley Wood LWS, covering an area of 10ha, is designated for the presence of unimproved acid grassland and deciduous woodland, part of this woodland is an Ancient Woodland Inventory Site (AWIS). This site is located partially within the land required for the Proposed Scheme;
- Padley Wood Poultry Farm LWS, covering an area of 9.4ha, is designated for the presence of ancient semi-natural woodland although this is not on the AWI. This site is located partially within the land required for the Proposed Scheme;
- Cavell Drive Meadow LWS, covering an area of 1.4ha, is designated for the presence of unimproved neutral grassland. This site is located 15m south-west of the land required for the Proposed Scheme; and
- North Wingfield LWS, covering an area of 24.5ha, is designated primarily for the presence of water vole but also has a small area of oak woodland and grassland, and supports kingfisher. This site is located 350m north of the land required for f the Proposed Scheme.

7.3.6 There is one AWIS of relevance to the assessment in the Stonebroom to Clay Cross area, which is of county/metropolitan value. Padley Wood AWIS covers an area of 2.1ha and forms part of a much larger woodland complex containing both semi-natural and plantation woodland and is contained within the Padley Wood LWS. Padley Wood AWIS is partially within the land required for the Proposed Scheme.

7.3.7 A review is being undertaken to identify any additional woodlands that are not currently listed on the AWI but that may nevertheless be ancient. These will be identified and assessed in the formal ES.

### *Habitats*

7.3.8 The following habitat types which occur in this area are relevant to the assessment.

#### Woodland

7.3.9 In addition to the aforementioned woodlands, there are three other areas of lowland deciduous woodland (likely to qualify as habitats of principal importance, and local Biodiversity Action Plan[49] (LBAP) habitats), which would be within or partly within the land required for the Proposed Scheme. These are woodland areas:

- near Banks Farm;
- within Doe Hill Community Park; and
- associated with Erewash Valley Line.

[49] *Lowland Derbyshire Biodiversity Action Plan 2011-2020*. Matlock, Lowland Derbyshire Biodiversity Partnership. Available online at: http://www.derbyshire.gov.uk/environment/conservation/Ecology/lowland_derbyshire_biodiversity_action_plan/

7.3.10 On a precautionary basis, pending the findings of field surveys, these woodlands are considered to be of up to district/borough value.

### Hedgerows

7.3.11 Many of the hedgerows within the land required for construction of the Proposed Scheme are likely to qualify as a habitat of principal importance and a LBAP habitat. Some may also meet the wildlife and landscape criteria to be 'important' hedgerows as defined in the Hedgerows Regulations 1997[50]. In addition, they could also provide commuting corridors for wildlife and nesting and feeding habitat. On a precautionary basis, pending the findings of field surveys, the hedgerow network is considered to be of up to district/borough value.

### Watercourses

7.3.12 The River Rother, Westwood Brook, and several smaller watercourses, would be crossed by the Proposed Scheme. The River Rother and Westwood Brook may qualify as habitats of principal importance and local BAP habitats. On a precautionary basis, pending the findings of field surveys, these watercourses are considered to be of up to county/metropolitan value. The smaller watercourses are considered to be of up to district/borough value.

### Water bodies

7.3.13 There are three ponds within, or partly within, the land required for construction of the Proposed Scheme. Some may qualify as habitats of principal importance[51], or BAP[52] habitats (e.g. if they support fauna species of high conservation importance such as great crested newts). On a precautionary basis, pending the findings of field surveys, these ponds have been assumed to be of up to county/metropolitan value.

### Ancient and veteran trees

7.3.14 Pending the results of the field surveys, it is possible that ancient and veteran trees will be present within land required for construction of the Proposed Scheme. On a precautionary basis any such ancient and veteran trees are considered to be of up to district/borough value.

## *Protected and notable species*

7.3.15 A summary of the likely value of fauna species of relevance to the assessment (excluding any features of species interest for which the sites described above are designated) is provided in Table 8.

[50] "Statutory Instrument 1997 No. 1160" Hedgerows Regulations 1997
[51] Natural Environment and Rural Communities Act 2006. London, Her Majesty's Stationery Office
[52] *Lowland Derbyshire Biodiversity Action Plan 2011-2020*. Matlock, Lowland Derbyshire Biodiversity Partnership. Available online at: http://www.derbyshire.gov.uk/environment/conservation/Ecology/lowland_derbyshire_biodiversity_action_plan/

Table 8: Species potentially relevant to the assessment within the Stonebroom to Clay Cross area

| Resource/feature | Value | Rationale |
|---|---|---|
| Bats | Up to regional | There are records of 23 roosts, 21 of these are pipistrelle species and common pipistrelle within 2km of the land required for construction of the Proposed Scheme. These are present in or within proximity to Clay Cross, Stonebroom, north Wingfield, Lower Pilsley, South Normanton, Newton, Stonebroom, Tibshelf, Blackwell and Morton.<br><br>The remaining two roosts are a whiskered bat roost in Lower Pilsley and a brown long-eared roost in North Wingfield.<br><br>There are records of eight species of bat throughout the area: noctule, brown long-eared bat, soprano pipistrelle, common pipistrelle, Daubenton's bat, Natterer's bat, whiskered bat and Brandt's bat. |
| Otter | Up to county/metropolitan | Populations of otter are localised but recovering in Derbyshire[53]. Habitat suitable for this species is present along the local watercourses and drainage ditches; however, there are no records of otter within 2km of the land required for the Proposed Scheme. |
| Water vole | Up to county/metropolitan | Populations of water vole are increasingly localised in Derbyshire and are declining[54]. Habitat suitable for water vole is present along the watercourses and drainage ditches, and there are records of their presence within a water body at Doe Hill Community Park within land required for the Proposed Scheme. Records indicate water vole are also present along Normanton Brook to the south of the land required for the Proposed Scheme and within North Wingfield LWS to the north of the Proposed Scheme, an unnamed stream that feeds into Westwood Brook near Peerwit Hall Farm to the east of the Proposed Scheme and within Salmon's Pond near Love Lane to the west of the Proposed Scheme. |
| Great crested newt | Up to county/metropolitan | There are no records of great crested newt within 2km of the land required for the Proposed Scheme.<br><br>There are three ponds within the land required for the Proposed Scheme in the Stonebroom to Clay Cross area. In the absence of further survey information, and on a precautionary basis, all are assumed to support great crested newt. |
| Birds | Up to county/metropolitan | Ongoing surveys have recorded kingfisher, a schedule 1 species, within Doe Hill Community Park.<br><br>The farmland and woodland in the area is suitable for breeding and wintering birds. Species associated with these habitats include lapwing, barn owl, skylark, tree sparrow, yellow wagtail, linnet and yellowhammer which breed in low numbers in farmland habitats, and a range of typical common woodland breeding and wintering birds. |
| White-clawed crayfish | Up to county/metropolitan | There are no records of white-clawed crayfish within 2km of the land required for the Proposed Scheme.<br><br>Suitable habitats for white-clawed crayfish are likely to be present in watercourses within land required for the Proposed Scheme. |

[53] Derbyshire Mammal Group (2003) *Mammal Status – Otter*. Available online at: https://www.derbyshiremammalgroup.org.uk/otter.html
[54] Derbyshire Mammal Group (2003) *Mammal Status – Water Vole*. Available online at: https://www.derbyshiremammalgroup.org.uk/water_vole.html

| | | |
|---|---|---|
| Aquatic invertebrates | Up to district/borough | Suitable habitat for aquatic invertebrates is likely to be present in watercourses including the River Rother, Westwood Brook, smaller watercourses, and in water bodies. |
| Terrestrial invertebrates | Up to district/borough | Suitable habitat for terrestrial invertebrates exists within the land required for construction of the Proposed Scheme. Such areas include ancient woodland within Padley Wood LWS and undisturbed grassland present along the Erewash Valley Line. |
| Fish | Up to district/borough | There are records of fish in the River Doe Lea, a tributary of the River Rother, including bullhead (listed on Annex II of the EC Habitats Directive[55]) and brown trout (data from Environment Agency National Fish Populations Database (NFPD)[56]).<br><br>Suitable habitat for protected and notable fish species is likely to be present in watercourses within land required for the Proposed Scheme. |
| Reptiles | Up to district/borough | There are records of grass snake at numerous locations but the closest is within 30m (near Doe Hill Lane) of the land required for the f the Proposed Scheme. There are records of slow worm (near Padley Wood Lane in proximity to Padley Wood Poultry Farm LWS) within 400m of the land required for the Proposed Scheme. Suitable habitat is likely to be present for reptiles, including grass snake and slow worm within Doe Hill Community Park and Padley Wood as well as rough grassland along the Erewash Valley Line. |

## 7.4 Effects arising during construction

### Avoidance and mitigation measures

7.4.1 The following measures have been included as part of the design of the Proposed Scheme (in addition to the landscape planting shown on the Map Series CT-06 in the Volume 2: LA09 Map Book, along the rail corridor which would be largely a mixture of woodland/scrub and grassland), and would contribute towards mitigating the losses of habitat and effects on species:

- new woodland planting would help towards offsetting the losses of woodland (e.g. near Banks Farm, within Doe Hill Community Park, Morton Colliery LWS, Padley Wood LWS and along the Erewash Valley Line), and to enhance connectivity between remaining woodlands;
- provision of new ecological ponds (ponds lost that do not support great crested newt would be replaced on a 1:1 basis);
- provision of some new species-rich hedgerows, using appropriate native species, to help towards offsetting the loss of hedgerows, and re-connecting the ecological network in the surrounding areas, including along the margins of the route of the Proposed Scheme; and

[55] *Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora*. Strasbourg, European Parliament and European council
[56] Environment Agency (2018) *Freshwater Fish Counts for all Species, all Areas and all Years*. Available online at: https://data.gov.uk/dataset/freshwater-fish-counts-for-all-species-all-areas-and-all-years

- provision of new grassland habitats, including some species rich grasslands to help towards offsetting the losses from the Proposed Scheme.

7.4.2 The assessment assumes implementation of the measures set out within the draft Code of Construction Practice (CoCP)[57], which includes translocation of protected species where appropriate.

7.4.3 Section 9 of the draft CoCP requires contractors to implement a range of measures to protect ecological receptors including the following:

- manage impacts from construction, including the timing of works, on designated sites, protected and notable species and other features of ecological importance such as ancient woodlands and watercourses;
- reduce habitat loss by keeping the working area to the reasonable minimum;
- reinstatement of areas of temporary habitat loss;
- restoration and replacement planting;
- implement management measures for potential ecological impacts to control dust, water quality and flow, noise and vibration, and lighting;
- provision of a watching brief, where relevant;
- relocation or translocation of species, soil and/or plant material, as appropriate;
- consultation with Natural England, the Environment Agency, local wildlife trusts and relevant planning authorities prior to and during construction; and
- compliance with all wildlife licensing requirements, including those for protected and invasive species and designated sites.

## Assessment of impacts and effects

7.4.4 The following section considers the impacts and effects on ecological features as a consequence of construction of the Proposed Scheme. All assessments have been undertaken on a precautionary basis, in the absence of survey information, and take account of the baseline value as presented in Section 7.3.

### *Designated sites*

7.4.5 Construction of Blackwell North embankment, associated temporary access track and permanent agricultural accommodation access track, would result in the permanent loss of 1.5ha (23.3%) of the Newton Disused Railway LWS, which is designated for its habitat mosaic and being a green corridor. Habitat loss and fragmentation would result in a permanent adverse effect on the site integrity that would be significant at the county/metropolitan level.

7.4.6 Construction of the Proposed Scheme associated with a temporary works access and permanent agricultural accommodation access track near Banks Farm, would result in

[57] Supporting document: Draft Code of Construction Practice

the permanent loss of 0.2ha (6.3%) of the Station House Grassland LWS, which is designated for its unimproved neutral grassland. Habitat loss would result in a permanent adverse effect on the site integrity that would be significant at the county/metropolitan level.

7.4.7 Construction of a highway realignment associated with Stonebroom Lane and the B6014 Doe Hill Lane/Station Road, would result in the permanent loss of 0.2ha (5.6%) of the Station Road, Morton LWS, which is designated for its lowland mire. Habitat loss would result in a permanent adverse effect on the site integrity that would be significant at the county/metropolitan level.

7.4.8 Construction of the Pilsley Road underbridge and the Stonebroom embankment, would result in the permanent loss of 28.3ha (80%) of the Morton Railway LWS, which is designated for its wet grassland. Habitat loss would result in a permanent adverse effect on the site integrity that would be significant at the county/metropolitan level.

7.4.9 Construction of a new drainage ditch, would result in the permanent loss of 0.4ha (4%) of the Morton Colliery LWS, which is designated for its habitat mosaic. Habitat loss would result in a permanent adverse effect on the site integrity that would be significant at the county/metropolitan level.

7.4.10 Construction of the Morton cutting, would result in the permanent loss of 9ha (90%) of the Padley Wood LWS and total loss of the 2.1 ha of AWIS, which is designated for its unimproved acid grassland and deciduous woodland. As well as potential direct impact through habitat loss, there is the potential for a permanent indirect effect as a result of the cutting causing an alteration to the hydrological regime. Habitat loss and potential alteration to hydrological regime would result in a permanent adverse effect on the site integrity that would be significant at the county/metropolitan level.

7.4.11 Construction of the Proposed Scheme associated with Morton Cutting near Padley Wood, would result in the permanent loss of 0.3ha (4.3%) of the Padley Wood Poultry Farm LWS, which is designated for its ancient semi-natural woodland although this is not on the AWI. Habitat loss would result in a permanent adverse effect on the site integrity and would be significant at the county/metropolitan level.

### *Habitats*

#### Woodland

7.4.12 Construction of the Proposed Scheme would result in the loss of 5.7ha of deciduous woodland from the Stonebroom to Clay Cross area, outside of the designated sites. The incorporated habitat creation is not expected to compensate for woodland loss and would result in a permanent adverse effect at the district/borough level. If the ongoing review identifies additional ancient woodlands, the permanent loss of these woodlands would result in an effect that would be significant at up to the county/metropolitan level.

#### Hedgerows

7.4.13 The Proposed Scheme would result in the permanent loss of hedgerows, and would result in severance of the network in many places, adversely affecting connectivity with the surrounding area. The effects of these losses will be fully assessed in the

formal ES. The Proposed Scheme includes new hedgerow planting which would help offset losses. Further hedgerow planting would be proposed as part of the design development. In the absence of this additional mitigation, the loss of these hedgerows would result in a permanent adverse effect on the conservation status of the hedgerow network that would be significant at up to the district/borough level.

#### Watercourses

7.4.14 The Proposed Scheme would cross Westwood Brook, via a culvert. This would extend the existing culverted section of the watercourse that takes it underneath the Erewash Valley Line. This would result in a permanent adverse effect that would be significant at up to district/borough level. It is anticipated that indirect effects would not be significant as they would be controlled through the implementation of measures in the draft CoCP. However, construction of the Proposed Scheme would result in the loss of sections of other smaller watercourses and severance of river corridors due to culverts, which would result in a permanent effect that would be significant at up to the district/borough level.

7.4.15 The Proposed Scheme would involve diverting 650m of the River Rother. This would avoid the need to construct two new culverts and would enable the river to remain entirely on the eastern side of the route of the Proposed Scheme and remove one of the existing culverts underneath the Erewash Valley Line. The diversion would be extended through the inclusion of meanders. The existing course of the River Rother, which intercepts two unnamed tributaries, would be retained as a separate watercourse in its existing channel. Direct and indirect effects of the diversion of the River Rother during construction would be controlled through implementation of measures in the draft CoCP. This would result in a temporary adverse impact that would be significant at up to county/metropolitan level.

#### Water bodies

7.4.16 Three ponds would be lost as a result of the construction of the Proposed Scheme. The loss of these ponds could result in an impact that would be significant at up to county/metropolitan level, however these ponds would be replaced reducing the effect to a level that is not significant.

#### Ancient and veteran trees

7.4.17 It is assumed that any ancient or veteran trees within the land required for construction of the Proposed Scheme in the Stonebroom to Clay Cross area would be permanently lost. Ancient and veteran trees are an irreplaceable resource and their potential loss would result in a permanent adverse effect that is significant at county/metropolitan level in each case.

### *Species*

#### Bats

7.4.18 The permanent removal of vegetation may have impacts on bats. Habitat loss would reduce the availability of foraging resource, and potentially result in the loss of roosts and fragmentation of commuting routes. This could particularly affect breeding populations of eight bat species within the area. Bats may also be affected by the

lighting associated with construction works, although it is anticipated that this would be controlled through measures detailed in the draft CoCP. On a precautionary basis, in the absence of further survey information, it has been assumed that impacts would result in a permanent adverse effect on the conservation status of the bat populations that would be significant at up to the regional level.

### Otters

7.4.19 The Proposed Scheme would directly impact the River Rother through its diversion and the removal of the existing culvert as well as crossing Westwood Brook and other smaller water courses that would be culverted. These habitats have the potential to support otter. On a precautionary basis, in the absence of further survey information, it has been assumed that construction of the Proposed Scheme would result in permanent adverse effect that would be significant up to the county/metropolitan level.

### Water vole

7.4.20 Water voles have been recorded on a water body within Doe Hill Community Park that is within the land required for the construction of the Proposed Scheme, and at other locations within 2km of land required for the construction of the Proposed Scheme. Direct impacts upon the River Rother, Westwood Brook and the water body within Doe Hill Community Park would result in habitat loss. On a precautionary basis, in the absence of further survey information, direct impacts to water voles would result in a permanent adverse effect on the conservation status of this species that would be significant up to the county/metropolitan level.

7.4.21 Indirect effects from construction are is likely to result in disturbance to water voles during the construction period, and prevent them from moving along the watercourses. However, it is anticipated that the indirect effects would be controlled through measures in the draft CoCP and therefore would not result in a significant effect on the conservation status of this species.

### Great crested newt

7.4.22 On a precautionary basis, it has been assumed that all three ponds and surrounding terrestrial habitat within the land required for the Proposed Scheme may support great crested newts and would be lost during construction. The loss of ponds supporting great crested newts and associated terrestrial habitat could result in the isolation and severance of breeding populations of great crested newts across this area. Where great crested newt is shown to be present by survey, two new ecological mitigation ponds would be created for every pond lost to the land permanently required for the Proposed Scheme. The implementation of this mitigation would reduce the effect of loss of breeding habitat to not significant. Suitable terrestrial habitat would be required around new ponds with links to encourage dispersal (e.g. by incorporating existing habitat or creating new habitat). In the absence of full mitigation, the loss of the ponds and surrounding land would result in a permanent adverse effect on the conservation status of great crested newts that would be significant at up to the county/metropolitan level.

### Birds

7.4.23 Construction of the Proposed Scheme would result in the loss of nesting and foraging habitat for a range of breeding and wintering birds, predominantly farmland and woodland species. These are likely to include barn owl and kingfisher, both Schedule 1 species. Kingfisher has been recorded in Doe Hill Community Park within land required for the Proposed Scheme. On a precautionary basis, in the absence of further survey information, it has been assumed that construction of the Proposed Scheme would result in a permanent adverse effect that would be significant at up to the county/metropolitan level.

### White-clawed crayfish

7.4.24 Construction of the Proposed Scheme would directly impact the River Rother Westwood Brook and other smaller watercourses. On a precautionary basis, in the absence of further survey information, it has been assumed that construction of the Proposed Scheme would result in a permanent adverse effect that would be significant up to the county/metropolitan level.

### Aquatic invertebrates

7.4.25 The land required for the Proposed Scheme would result in loss of habitat suitable for aquatic invertebrates (potentially including species of principal importance). On a precautionary basis, in the absence of further survey information, it has been assumed that construction of the Proposed Scheme would result in a permanent adverse effect that would be significant at up to the district/borough level.

### Terrestrial invertebrates

7.4.26 The land required for the Proposed Scheme would result in loss of habitat suitable for terrestrial invertebrates (including species of principle importance). On a precautionary basis, in the absence of further survey information, it has been assumed that construction of the Proposed Scheme would result in a permanent adverse effect that would be significant at up to the district/borough level.

### Fish

7.4.27 There are historic records of fish in the River Doe Lea, a tributary of the River Rother, including species such as European bullhead (listed on Annex II of the EC Habitats Directive) and brown trout. The River Rother and Westwood Brook, as well as several other smaller watercourses, would be directly affected and may require assessment under the Water Framework Directive (WFD)[58]. On a precautionary basis, in the absence of further survey information, it has been assumed that construction of the Proposed Scheme would result in a permanent adverse effect that would be significant at up to the district/borough level.

### Reptiles

7.4.28 There are records of grass snake within 30m of the land required for the construction of the Proposed Scheme and records of slow worm within 400m of land required for the construction of the Proposed Scheme. Suitable habitat is likely to be present for

[58] EU Water Framework Directive http://ec.europa.eu/environemt/water/water-framework/index_en.html

reptiles, such as grassland and scrub habitats including Doe Hill Community Park and Erewash Valley Line. On a precautionary basis in the absence of further survey information, it has been assumed that construction of the Proposed Scheme would result in a permanent adverse effect that would be significant at up to the district/borough level.

7.4.29 Effects on other habitats and species that would be significant at the local/parish level during construction will be reported in the formal ES.

7.4.30 Indirect effects from changes in air quality, such as that arising from increased levels of construction traffic, will be considered where appropriate. These effects will be reported in the formal ES.

## Other mitigation measures

7.4.31 Further measures currently being considered, but which are not yet part of the design and will be informed by the findings of the ongoing field surveys and engagement with relevant stakeholders, include:

- options for additional woodland and scrub planting to reduce the fragmentation of woodland and scrub habitat within Doe Hill Community Park;
- ancient woodland is an irreplaceable resource and this loss is considered to be a permanent adverse residual effect. The loss of ancient woodland would be partly compensated through a package of measures bespoke to the woodland affected. Ancient woodland soil with its associated seed bank would be salvaged and translocated to receptor sites that have, wherever possible, been chosen because they link to and/or are adjacent to ancient woodland fragments. This would seek to increase the connectivity of fragmented ancient woodland parcels. Other measures such as planting native tree and shrub species of local provenance, enhancement of retained woodland, and translocation of coppice stools and dead wood, would be undertaken as appropriate;
- landscape mitigation planting and woodland habitat creation to provide replacement habitat, and/or to enhancement of remaining woodlands;
- provision of additional hedgerows to help maintain the connectivity of the network;
- options to create new species rich grasslands (including translocation where appropriate) in response to grassland losses such as at the Morton Railway LWS and Padley Wood LWS;
- provision of additional measures to facilitate connectivity where significant foraging or commuting routes of fauna species would be affected;
- use of temporary fencing or retention of existing habitat links to reduce the risk of disturbance to otters during construction; design of watercourse culverts and underpasses to allow the free passage of wildlife;

- options to undertake river corridor enhancement on River Rother diversion;
- provision of alternative roosting habitat for bats;
- provision of additional ponds (on a two to one basis where existing ponds supporting great created newts are lost), outside the area required for the permanent works but within the land required for construction of the Proposed Scheme, and suitable terrestrial habitat around these ponds with habitat links to allow dispersal. Some of the above may also be achieved through strategic mitigation, which is currently being discussed with relevant stakeholders; and
- considering the need for inclusion of structures to reduce severance effects on bats.

## Summary of likely residual significant effects

7.4.32 Taking into account mitigation proposed in the design of the Proposed Scheme set out above, the anticipated significant residual ecological effects during construction are described in Table 9.

Table 9: Residual significant effects on ecological resources/features during construction

| Resource/feature | Residual effect | Level at which the effect would be significant |
|---|---|---|
| Newton Disused Railway LWS | Permanent adverse effect on site integrity due to loss of 1.5ha (23.3%) of habitat mosaic and the site becoming fragmented | County/metropolitan |
| Station House Grassland LWS | Permanent adverse effect on site integrity due to loss of 0.2ha (6.3%) of unimproved neutral grassland | County/metropolitan |
| Station Road, Morton LWS | Permanent adverse effect on site integrity due to loss of 0.2ha (5.6%) of lowland mire. | County/metropolitan |
| Morton Railway LWS | Permanent adverse effect on site integrity due to loss of 2.8ha (80%) of wet grassland | County/metropolitan |
| Morton Colliery LWS | Permanent adverse effect on site due to loss of 0.4ha (4%) of habitat mosaic | County/metropolitan |
| Padley Wood LWS | Permanent adverse effect on site integrity due to loss of 9ha (90%) of unimproved acid grassland. | County/metropolitan |
| Padley Wood Poultry Farm LWS | Permanent adverse effect on site integrity due to loss of 0.3ha (4.3%) of ancient semi-natural woodland although this is not on the AWI. | County/metropolitan |
| Padley Wood AWIS | Permanent adverse effect on site integrity due to the total loss of 2.1ha of ancient woodland | County/metropolitan |
| Woodland | Permanent adverse effect due to loss of 5.7ha of woodland outside of designated sites | Up to county/metropolitan |

| Resource/feature | Residual effect | Level at which the effect would be significant |
|---|---|---|
| Hedgerow | Permanent loss of hedgerows. | Up to district/borough |
| Watercourses | Loss of sections of small watercourse and severance of smaller unnamed watercourses. Diversion of River Rother. | Up to county/metropolitan |
| Ancient and veteran trees | Potential permanent loss of individual trees | Up to county/metropolitan |
| Bats | Potential permanent adverse effect on conservation status due to loss of roosts, foraging habitat and fragmentation | Up to regional |
| Otter | Habitat loss and construction effects would affect River Rother, Westwood Brook and several smaller watercourses and water bodies crossed by the Proposed Scheme. | Up to county/metropolitan |
| Water vole | Habitat loss and construction effects would affect several smaller watercourses and water bodies crossed by the Proposed Scheme, including one with records of supporting water vole | Up to county/metropolitan |
| Great crested newts | Loss of three ponds and surrounding terrestrial habitat; which may support great crested newts | Up to county/metropolitan |
| Birds | Permanent adverse impact due to loss of breeding and foraging habitat | Up to county/metropolitan |
| White-clawed crayfish | Habitat loss and construction effects would affect River Rother, Westwood Brook and several smaller watercourses and water bodies crossed by the Proposed Scheme | Up to county/metropolitan |
| Aquatic Invertebrates | Habitat loss and construction effects would affect River Rother, Westwood Brook and several smaller watercourses and water bodies crossed by the Proposed Scheme | Up to district/borough |
| Terrestrial Invertebrates | Habitat loss due to construction | Up to district/borough |
| Fish | Habitat loss and construction effects would affect River Rother, Westwood Brook and several smaller watercourses and water bodies crossed by the Proposed Scheme | Up to district/borough |
| Reptile | Loss of suitable habitat supporting common species of reptile. | Up to district/borough |

## 7.5 Effects arising during operation

### Avoidance and mitigation measures

7.5.1 There are no specific measures currently identified to avoid or mitigate ecological effects during operation of the Proposed Scheme within this section of the route.

### Assessment of impacts and effects

7.5.2 This section considers the impacts and effects on ecological features during operation of the Proposed Scheme. All assessments are based on a precautionary basis, in the absence of survey information.

7.5.3 Bats are at risk of being struck by trains or possibly harmed by turbulence, particularly at frequently used commuting/foraging routes that cross the Proposed Scheme. This represents a potential permanent adverse effect on conservation status of the bat species concerned that would be significant at up to the county/metropolitan level.

7.5.4 Barn owls are at risk of colliding with trains, particularly near Newton Disused Railway LWS/Banks Farm, where there is suitable grassland foraging habitat. The grassland vegetation that would grow along the embankments of the Proposed Scheme may encourage barn owls to forage close to trains, with the risk that they may be killed. Mortality, even if infrequent, could affect the conservation status of this Schedule 1 species and the ongoing reduction in numbers would result in a permanent adverse effect that would also be significant at up to county/metropolitan level. Effects on all other habitats and species would likely be significant at the local/parish level during operation. These effects will be assessed and reported in the formal ES.

### Other mitigation measures

7.5.5 Additional mitigation measures currently being considered include:

- updating the HS2 barn owl mitigation plan[59], which has been developed to provide measures that will be implemented to reduce the effects of the Proposed Scheme to a level that is not significant. This is likely to include seeking opportunities to provide barn owl nest boxes and where feasible habitat enhancement opportunities at least 3km from the land required for construction of the Proposed Scheme in consultation with landowners; and
- structures to reduce mortality to bats.

### Summary of likely residual significant effects

7.5.6 Taking into account mitigation included as part of the Proposed Scheme design, the anticipated significant residual ecological effects during operation are detailed in Table 10.

[59] Currently in development for Phase One of HS2

Table 10: Residual significant effects on ecological resources/features during operation

| Resource/feature | Residual effect | Level at which the effect would be significant |
|---|---|---|
| Bats | Potential permanent adverse effect on conservation status due to collision with trains. | Up to county/metropolitan |
| Barn owl | Potential permanent adverse effect on conservation status due to collision with trains. | Up to county/metropolitan |

## Monitoring

7.5.7 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme.

7.5.8 There are no area-specific requirements for monitoring ecology and biodiversity effects or mitigation during the operation of the Proposed Scheme in the Stonebroom to Clay Cross area.

# 8 Health

## 8.1 Introduction

8.1.1 This section identifies the communities within the Stonebroom to Clay Cross area (LA09) that would be subject to impacts associated with the Proposed Scheme and describes the changes that are considered to be potentially important for the health and wellbeing of people within these communities, where these effects are considered to be consequential.

8.1.2 Engagement with key public health bodies is underway, including Public Health England, relevant directors of Public Health and Health and Wellbeing Boards, and relevant Clinical Commissioning Groups. The purpose of the engagement has been to understand the health issues in the Stonebroom to Clay Cross area that may not be identified solely through a review of publicly available data. Engagement with key public health bodies will continue as part of the development of the Proposed Scheme.

8.1.3 This section deals specifically with impacts and effects at a local level within the Stonebroom to Clay Cross area. Health effects across the Proposed Scheme as a whole are assessed in the route-wide health assessment contained in Volume 3: Route-wide effects.

8.1.4 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme are provided in the Volume 2: LA09 Map Book.

## 8.2 Scope, assumptions and limitations

8.2.1 The scope, assumptions and limitations for the health assessment are set out in Volume 1 and the Scope and Methodology Report (SMR)[60].

8.2.2 As set out in the SMR, the health assessment is based on a broad understanding of health, consistent with the World Health Organization (WHO) definition of health as 'a state of complete physical, mental and social well-being and not merely an absence of disease or infirmity'. An individual's health is mostly determined by genetics and lifestyle factors, but for a large enough population many other factors, or 'health determinants', are known to be important, and these factors may be affected by the Proposed Scheme.

8.2.3 The assessment has considered the impacts of the Proposed Scheme on a range of environmental and socio-economic 'health determinants', which could result in adverse or beneficial effects on health and wellbeing.

[60] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

8.2.4 The health determinants of relevance within the Stonebroom to Clay Cross area are:

- for impacts during construction (temporary and permanent):
  - neighbourhood quality;
  - access to services, health and social care;
  - access to green space, recreation and physical activity; and
  - social capital.
- for impacts during operation (permanent):
  - neighbourhood quality;
  - access to green space, recreation and physical activity; and
  - education.

8.2.5 The geographic extent of the health assessment covers those areas where impacts on health determinants are predicted to occur.

8.2.6 The health assessment is based on a review of evidence linking changes in health determinants to potential health outcomes. This information will be presented in a concise review of the key literature and included in the formal ES. The evidence varies in its strength; for example, the evidence linking physical activity to health outcomes is strong, whereas the evidence linking social capital with health outcomes is moderate. The strength of evidence does not necessarily determine the importance of a health effect, but is an indication of the level of certainty in the assessment. Additionally, there is greater certainty in the prediction of an impact on a health determinant than the consequent effect on health.

8.2.7 There is no established or widely accepted framework for assessing the significant health effects of a development proposal. The SMR sets out a methodology for describing the impacts on health determinants in terms of the magnitude and duration of the change and the extent of the population exposed to this change. It also draws attention to the strength of evidence that links a change in health determinant with health effects. This framework permits the assessment to describe the impacts on determinants in a largely qualitative manner, with some structure to the relative scale of these impacts to give a sense of the importance of the potential health effects. This does not, however, provide a clear basis for drawing conclusions as to whether a health effect is likely to be 'significant'.

8.2.8 Potential health effects have been identified based on information that is available at this stage of the assessment. A full assessment of health effects, applying the assessment criteria set out in the SMR, will be provided in the formal ES.

# 8.3 Environmental baseline

## Existing baseline

### *Description of communities in the Stonebroom to Clay Cross area*

8.3.1 The Stonebroom to Clay Cross area is predominantly semi-rural, made up of a few towns and villages. Outside of the main settlements within a more rural setting, there are small clusters of dwellings and individual dwellings. As reported in Section 14, Traffic and transport, there are a number of public rights of way (PRoW) within the vicinity of the route of the Proposed Scheme, which provide access to the countryside and are considered important contributors to health and wellbeing.

8.3.2 For the purposes of the health assessment, the study area is divided into the communities described below. A description of community facilities is provided in Section 6, Community.

#### Tibshelf

8.3.3 Tibshelf is a village that comprises approximately 1,600 residential properties. The nearest residential properties would be approximately 20m west of the route of the Proposed Scheme. There are a few community facilities within Tibshelf which include allotments, a public house, a post office, a nursery, primary schools, a secondary school, a village hall, a care home and churches. In addition, Tibshelf ponds, Shetland Road recreation ground and Doe Hill Community Park provide recreational opportunities for the general public.

#### Stonebroom and Morton

8.3.4 Stonebroom and Morton are villages located primarily west of the route of the Proposed Scheme. Stonebroom contains approximately 1,400 residential properties and Morton contains approximately 550 residential properties. Some properties in Stonebroom would be on the route, while the nearest residential properties in Morton would be located approximately 70m west of the route.

8.3.5 The villages are predominantly residential in nature but contain a few community facilities including churches, a care home, a public house, a post office, a nursery and a primary school. Ain Moor Wood and Padley Wood provide recreational opportunities for the general public.

#### Clay Cross

8.3.6 Clay Cross is a town partially within the study area, which is bordered on the east by the existing Erewash Valley Line. The town contains approximately 4,300 residential properties. The nearest residential properties would be located approximately 400m north-west of the route of the Proposed Scheme, at the point where it connects with the Erewash Valley Line.

8.3.7 The main concentration of local services and community facilities within the Stonebroom to Clay Cross area are located in Clay Cross and include allotments, a nursery, primary schools and a community centre.

### *Demographic and health profile of the Stonebroom to Clay Cross area*

8.3.8 The local communities in the Stonebroom to Clay Cross area have a relatively low population density, commensurate with the semi-rural nature of the area.

8.3.9 Data provided by the Office for National Statistics[61] for the local authority areas of Bolsover District Council (BDC) and North East Derbyshire District Council (NEDDC) shows that this population has a broadly similar health status compared with the national (England) averages.

8.3.10 The population has similar levels of deprivation to the national average, with regard to the combined indices of multiple deprivation[62], and the health domain (a sub-set of the indices of multiple deprivation).

8.3.11 The available data provides detail down to local authority level and enables a demographic and health profile to be made of the population within the Stonebroom to Clay Cross area. The description of the whole population, and the populations within each local authority, does not exclude the possibility that there will be some individuals or small groups of people who do not conform to the overall profile.

## 8.4 Effects arising during construction

### Avoidance and mitigation measures

8.4.1 Consideration of potential health issues is an integral part of the planning and design of the Proposed Scheme, alongside consideration of other environmental, community and economic issues. As far as reasonably practicable, mitigation measures have been incorporated into the design of the Proposed Scheme with the aim of avoiding or reducing adverse health effects. Examples of the mitigation measures incorporated into the design of the Proposed Scheme include the following:

- reducing the loss of property and community assets, insofar as reasonably practicable;
- reducing visual intrusion and noise, insofar as reasonably practicable;
- incorporating landscape design and screening into the design; and
- permanent realignment and diversion of a number of PRoW and roads to maintain access (see Section 14, Traffic and transport for further detail).

8.4.2 In addition, the locations of construction compounds and site haul routes have been selected to reduce exposure to construction impacts insofar as reasonably practicable.

8.4.3 HS2 Ltd would require its contractors to comply with the environmental management regime for the Proposed Scheme, which would include the measures set out in the draft Code of Construction Practice (CoCP)[63], which provides a general basis for route-wide construction environmental management. Contractors would also be required to

[61] The Office for National Statistics (ONS) provides spatial data on levels of deprivation, using indicators of: 'multiple deprivation', 'employment', 'education', 'barriers to housing and social services', 'crime' and 'living environment'. These data are available by Lower Super Output area.
[62] Department for Communities and Local Government (2015) English Indices of Deprivation 2015. Available online at: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015
[63] Supporting document: Draft Code of Construction Practice

comply with the measures in Local Environmental Management Plans (LEMP), which apply the environmental management strategies at a local level.

8.4.4 The CoCP will be the means of controlling the construction works associated with the Proposed Scheme to ensure that the effects of the works upon people and the natural environment are reduced or avoided so far as reasonably practicable.

8.4.5 The CoCP will require the nominated undertaker and its contractors to: produce and implement a community engagement framework and provide appropriately experienced community relations personnel to implement the framework; provide appropriate information; and to be the first point of contact to resolve community issues. The nominated undertaker would be required to take reasonable steps to engage with the community, focusing on those who may be affected by construction impacts, including local residents, businesses, landowners and community resources, and the specific needs of protected groups (as defined in the Equality Act 2010).

8.4.6 In the event of any loss of a community facility, the options for mitigating significant community effects to be explored by HS2 Ltd would include:

- improving or altering the remaining portion of the community facility;
- improving other existing community facilities in the area that could reduce the effect;
- improving accessibility to other community facilities; and/or
- identifying land owned by the relevant local authority that could be brought into use as a community facility with its agreement.

## Assessment of impacts and effects

### *Neighbourhood quality*

8.4.7 The term 'neighbourhood quality' is used in this assessment to describe the combination of environmental factors that influence people's experience of, and feelings about, their local environment. When these factors are altered people's levels of satisfaction with their living environment may change. In turn, this could affect mental wellbeing or behaviours such as the use of outside space.

8.4.8 The construction of the Proposed Scheme would affect neighbourhood quality through impacts such as noise, emissions to air, visual impacts and additional traffic, including heavy goods vehicles (HGV). These will be assessed in the relevant sections of the formal ES, with a focus on those receptors, or groups of receptors, that are most affected. The Community section of the formal ES will provide a combined assessment, which will identify locations that are subject to significant environmental effects for two or more topics (e.g. Sound, noise and vibration as well as Landscape and visual).

8.4.9 In contrast, a qualitative approach is taken to assessing impacts on neighbourhood quality. The assessment looks at changes in character, tranquillity and amenity across the neighbourhood as a whole, including streets and other public and private outdoor areas. This is judged on a case-by-case basis, taking into account the characteristics of each neighbourhood. It will be informed by the findings from other assessments, but

does not rely on the same significance thresholds, as it is not focused on individual receptors. The assessment of health and wellbeing effects considers issues such as people's feelings of attachment to, and pride in, their neighbourhood and enjoyment of outside space, and how these may change.

8.4.10 The sections most relevant to the neighbourhood quality assessment are: Section 5, Air quality; Section 11, Landscape and visual; Section 13, Sound, noise and vibration; and Section 14, Traffic and transport.

8.4.11 Dust emissions from construction activities are considered in Section 5, Air quality, which identifies no adverse effects with respect to the effects of construction activities on dust soiling and human health within the Stonebroom to Clay Cross area, taking account of mitigation measures contained in the draft CoCP. Therefore, it is not expected that dust emissions around construction sites would contribute to adverse impacts on neighbourhood quality.

8.4.12 The construction of the Proposed Scheme would have temporary and permanent[64] impacts on neighbourhood quality in areas close to construction sites. Impacts on neighbourhood quality have the potential to affect the wellbeing of residents adversely during the construction phase, by giving rise to negative feelings in relation to quality of life and the local environment, and potentially changing behaviours, such as deterring the use of outdoor space.

8.4.13 Construction activities would have the potential to generate a noticeable change in noise at outdoor areas and at neighbourhoods in proximity to the route of the Proposed Scheme, as reported in Section 13, Sound, noise and vibration. It is currently expected that the construction of the Proposed Scheme may be visible from nearby neighbourhoods, as reported in Section 11, Landscape and visual. This has the potential to contribute to impacts on neighbourhood quality and will be assessed in the formal ES.

8.4.14 Traffic and transport impacts in the Stonebroom to Clay Cross area would include:

- construction vehicle movements to and from the various construction compounds and sites;
- temporary and permanent road closures and associated diversions; and
- temporary and permanent alternative routes for PRoW.

8.4.15 Construction traffic, including HGV, would be present on a number of roads in the Stonebroom to Clay Cross area, as reported in Section 14, Traffic and transport.

8.4.16 The link between health and the aesthetic value of the public realm is not well understood, but there is moderate evidence to suggest that an attractive environment can improve people's enjoyment and sense of wellbeing. Conversely, poor quality environments have been shown to have negative effects on people's health. There is

[64] The SMR defines temporary changes (impacts) to health determinants as short-term (<6 months), medium-term (6 months – 2 years), and long-term (2 years +). Permanent impacts have not been defined in the SMR. A change in a health determinant lasting 4 years or more will be considered as a permanent impact. A professional judgement will be made as to when an impact would lead to a permanent effect on the health of the population.

moderate evidence that people have a preference for views of natural environments over man-made environments, and that exposure to views of natural environments is associated with increased wellbeing.

8.4.17 Overall, it is considered that the construction of the Proposed Scheme has the potential to affect wellbeing through changes to neighbourhood quality. This will be assessed in the formal ES.

### *Access to services, health and social care*

8.4.18 There is strong evidence linking access to healthcare facilities with health outcomes, and there is also weak to moderate evidence to suggest that transport problems are a key barrier to people's ability to access these services. There is moderate evidence to suggest that access to shops and other local services can affect health. This is based on a range of factors affecting quality of life, and includes issues such as reducing feelings of isolation and enabling participation in society, as well as accessing basic needs such as food shopping.

8.4.19 The Stonebroom to Clay Cross area is predominantly semi-rural in character. Typically, there is a reliance on a limited range of shops and services in nearby settlements within the area. To access alternative services and facilities it is necessary to travel longer distances. There is potential for communities to experience increased difficulty in accessing shops and community services (such as post offices, banks, libraries) as a result of increased journey times during construction. This will be assessed and reported in the formal ES.

### *Access to green space, recreation and physical activity*

8.4.20 There is moderate evidence to show that access to green space contributes to good mental health. There is also moderate evidence that environmental factors such as access to high quality green space, safety and amenity, can influence participation in physical activity. Physical activity is strongly linked to health outcomes.

8.4.21 Construction of the Proposed Scheme may impact on levels of access to green space and physical activity, including:

- impacts on PRoW, including temporary closures, diversions and loss of amenity, which may deter the use of these routes by walkers, cyclists and equestrians;
- any loss of green space or facility used for physical activity; and
- the presence of construction traffic, including HGV, on the local road network, which may deter their use by walkers, cyclists and equestrians.

8.4.22 There would be direct impacts on access to green space, recreation and physical activity at Doe Hill Community Park, where construction of the Stonebroom cutting and Stonebroom embankment would temporarily require approximately 35% of the land within the Doe Hill Community Park for a period of approximately three years and six months.

8.4.23 Following this, approximately 10ha (approximately 25%) of open space within the park would be permanently lost to land required for the Stonebroom cutting and

embankment. The cutting and embankment would also sever the existing circular/figure-of-eight paths within the park in two places, and sever the park into two parts. An overbridge would be provided to reconnect the paths, and to connect the two remaining sections of the park. Notwithstanding the implementation of this mitigation, impacts on access to green space, recreation and physical activity would persist.

8.4.24 As reported in Section 14, Traffic and transport, the route of the Proposed Scheme would intersect a number of PRoW in the Stonebroom to Clay Cross area. The impacts on amenity and recreational value of these footpath networks, and therefore levels of physical activity and associated health and wellbeing effects, will be assessed in the formal ES.

8.4.25 Construction traffic would mainly use the site haul routes along the route of the Proposed Scheme. Some construction traffic, however, including HGV, would be present on local roads. This could obstruct or deter pedestrians, cyclists and equestrians from using these routes. Health effects associated with these impacts, including consideration of levels of use and available alternative routes for active travel and recreation, will be assessed in the formal ES.

### *Social capital*

8.4.26 The connections between individuals within communities, and the increased likelihood that arises through these networks for individuals to feel valued, to feel a sense of belonging, to have companionship and to support each other, is important for health and wellbeing. A measure of the effectiveness of these connections within communities is termed 'social capital' and is a recognised determinant of health. The Office for National Statistics defines social capital as follows:

'In general terms, social capital represents social connections and all the benefits they generate. Social capital is also associated with civic participation, civic-minded attitudes and values which are important for people to cooperate, such as tolerance or trust'[65].

8.4.27 There is moderate evidence for a link between social capital and health and wellbeing outcomes. A decrease in social capital has the potential to reduce the beneficial health effects that are gained through social contact and support, social participation, reciprocity and trust. Adverse effects on health from changes in social capital could be experienced as a reduction in wellbeing or as physiological effects on the body's hormonal and immune systems, with increased susceptibility to mental and physical illness.

8.4.28 The settlements along the route of the Proposed Scheme support small, well-established communities. The size of the temporary construction workforce may be substantial relative to the size of these local communities. During the day, the workforce would be present on construction sites and compounds throughout the area, including satellite compounds in the vicinity of the settlements of Stonebroom,

[65] Office for National Statistics- Measuring Social Capital. Available online at: http://webarchive.nationalarchives.gov.uk/20160107115718/http://www.ons.gov.uk/ons/dcp171766_371693.pdf

Morton and Clay Cross. The duration of the activities at each site would range from approximately one year to three years and six months. The presence of construction workers is likely to be noticeable, with construction vehicles using local roads to access compounds, and workers using facilities such as shops, restaurants and public houses within settlements.

8.4.29 The introduction of a temporary construction workforce into communities could have the potential to alter people's perceptions and interactions within their communities, modifying behaviour and the value they place on social capital. Such a reduction in social capital has the potential to adversely affect wellbeing, and may influence behaviours that are beneficial to wellbeing such as the use of community facilities.

8.4.30 The draft CoCP includes a commitment to produce and implement a community engagement framework and provide appropriately experienced community relations personnel. HS2 Ltd will engage with local authorities and community representatives to identify measures aimed at fostering and maintaining good relationships between the workforce and local communities. Any measures identified will be included within the community engagement framework as appropriate.

8.4.31 The Community section of the ES will include an assessment of impacts resulting from the loss of residential properties. The loss of five properties is identified as the threshold for a significant Community effect. In some cases, the Community assessment may identify significant impacts below this threshold, for example where the demolitions make up a significant proportion of a very small community.

8.4.32 The health assessment considers changes to the social environment and loss of social networks experienced by the remaining community following the loss of residential properties. For this to have an adverse impact on overall levels of social capital, the loss of homes would need to make up a sizeable proportion of the local community, with the potential to result in the direct loss of contacts in the local area and/or a noticeable reduction in the number of people using local facilities. This will be judged on a case-by-case basis, taking account of the size of the community and its characteristics. Therefore, not all of the significant effects identified in the Community section will result in adverse health and wellbeing effects.

8.4.33 In the Stonebroom to Clay Cross area, no health effects are anticipated on the remaining community, where four residential properties would be demolished as a result of the Proposed Scheme. Effects on residents directly impacted by demolitions are assessed in Volume 3, Section 7, Health.

8.4.34 Road closures and diversions required for the construction of the Proposed Scheme would have the potential to reduce community connectivity by increasing journey times between communities.

## Other mitigation measures

8.4.35 Any other mitigation identified to reduce adverse impacts on health determinants during the construction of the Proposed Scheme will be described in the formal ES.

8.4.36 HS2 Ltd will engage with local authorities and community representatives to identify measures aimed at fostering positive relationships between local communities and

the temporary construction workforce. Any measures identified will be included within the Community Engagement Framework.

8.4.37 HS2 Ltd will continue to engage with owners/operators to identify reasonably practicable measures to help mitigate potential adverse effects identified in this assessment. Any other mitigation measures will be described in the formal ES.

## 8.5 Effects arising from operation

### Avoidance and mitigation measures

8.5.1 Adverse impacts on health determinants would be reduced insofar as reasonably practicable through mitigation measures incorporated into the design of the Proposed Scheme to reduce adverse effects on people. The mitigation measures incorporated into the design of the Proposed Scheme in the Stonebroom to Clay Cross area will be reported in the formal ES.

### Assessment of impacts and effects

#### *Neighbourhood quality*

8.5.2 Operational noise would have the potential to generate a noticeable change in noise at outdoor areas and at neighbourhoods in proximity to the route of the Proposed Scheme, as reported in Section 13, Sound, noise and vibration. The permanent features of the Proposed Scheme may be visible from outdoor areas as reported in Section 11, Landscape and visual. This has the potential to contribute to impacts on neighbourhood quality and will be assessed in the formal ES.

#### *Access to green space, recreation and physical activity*

8.5.3 The potential impact on neighbourhood quality during operation, described above, has the potential to change behaviours, such as reducing the use outdoor spaces. The effects arising from the operation of the Proposed Scheme will be assessed in the formal ES.

### Other mitigation measures

8.5.4 If a need is identified for mitigation to reduce adverse impacts on health determinants during the operation of the Proposed Scheme in this area, the mitigation will be described in the formal ES.

### Monitoring

8.5.5 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme.

8.5.6 No area-specific monitoring of health effects during the operation of the Proposed Scheme have been identified at this stage.

# 9 Historic environment

## 9.1 Introduction

9.1.1 This section of the report provides a description of the current baseline for heritage assets and the likely impacts and significant effects identified to date resulting from the construction and operation of the Proposed Scheme within the Stonebroom to Clay Cross area. Consideration is given to the extent and value of heritage assets including archaeological and palaeo-environmental remains, historic buildings, the built environment and historic landscape.

9.1.2 Engagement has been undertaken with Historic England, North East Derbyshire District Council (NEDDC), Erewash Borough Council (EBC), Chesterfield Borough Council (CBC) and Bolsover District Council (BDC). The purpose of this engagement has been to discuss the assessment approach, to obtain relevant baseline information and to inform the design development and assessment of the Proposed Scheme. Engagement will continue as part of the development of the Proposed Scheme and to inform the formal assessment.

9.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2: LA09 Map Book. Only designated heritage assets within the Stonebroom to Clay Cross area are shown on maps CT-10-106b to CT-10-111a. Non-designated heritage assets have also been assessed as part of this work, although they are not illustrated on these maps.

9.1.4 A gazetteer of designated and non-designated heritage assets with accompanying maps will be included in the formal ES. The formal ES will also include a Historic Landscape Characterisation Report, which will identify historic landscape character areas potentially affected by the Proposed Scheme.

9.1.5 Assets have been identified in this section of the report using their National Heritage List for England (NHLE) or Historic Environment Record (HER) name and number. If no record number is known (e.g. an asset identified from historic mapping), then the asset is referred to by name. Project-specific asset identification numbers will be used for the formal ES.

## 9.2 Scope, assumptions and limitations

9.2.1 The scope, key assumptions and limitations for the historic environment assessment are set out in full in Volume 1, Section 8 and the Scope and Methodology Report (SMR)[66], including the method for determining the value of a heritage asset and magnitude of impact (Tables 19 and 20 in the SMR, respectively).

9.2.2 The assessment focuses on the extent to which the Proposed Scheme would affect designated and non-designated heritage assets. Impacts on assets as a result of the

[66] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

Proposed Scheme would occur largely through the physical removal and alteration of heritage assets and changes to their setting.

9.2.3 The study area within which a detailed assessment of all assets, designated and non-designated, has been carried out is defined as the land required for the Proposed Scheme plus 500m in rural areas. This is referred to in the remainder of this assessment as the 500m study area.

9.2.4 The setting of all designated heritage assets within a study area of up to 2km from the land required for the Proposed Scheme has been considered. This is referred to in the remainder of this assessment as the 2km study area.

9.2.5 The historic environment methodology includes the consideration of the relevant intra-project effects. These interactions will be included in the assessment of impacts and effects in the formal ES.

9.2.6 Where noise is considered, this is within the context of the contribution that this makes to the heritage value of the assets, and is not a reference to absolute noise levels or sound, or the noise or vibration impacts on the health and quality of life of people who live in or visit the area.

9.2.7 The baseline studies informing this assessment have been drawn from a wide and comprehensive range of information sources. These will be supported by a programme of non-intrusive survey, including geophysical survey, the results of which will be reported in the formal ES.

9.2.8 At this stage of the design development, heritage assets within the land required to construct the Proposed Scheme are assumed to require complete removal and the assessment has, in the main, been undertaken on that basis. However, in relation to the following assets, although the asset is within the land required for the construction of the Proposed Scheme and may be affected, any effect is unlikely to be significant:

- Morton Park (MDR 6055);
- Park Hall (site of?) (MDR 6054);
- Wingfield Mill (site of) (MDR 6056);
- the Midland Railway Pilsley Extension (route of) (MDR 1110);
- the Erewash Valley Line (MDR 12415);
- the original Doe Hill Station and Buildings (site of) (MDR 1105); and
- the later Doe Hill Station Buildings (MDR 1104).

9.2.9 With respect to overhead line diversions/realignments in particular, it is likely that the majority of the heritage assets can in fact be retained, as the land is only required to allow for raising or lowering of pylons and/or re-stringing of cables, or to provide an access route to the works.

9.2.10 Common features of the historic landscape such as marl pits, field boundaries and former areas of ridge and furrow are not individually considered but have been included in the baseline, as part of the historic landscape character and will be considered as part of the overall assessment of impacts on historic landscape reported in the formal ES.

9.2.11 In undertaking the assessment, the following limitations were identified and assumptions made:

- field surveys are ongoing, and are subject to land access and site conditions. The results of field surveys will be reported within the formal ES;
- desk-based assessment is ongoing and data on non-designated heritage assets will be described more fully in the formal ES and accompanying technical appendices; and
- intra-project topic assessments are ongoing and will be considered as part of the assessment of historic environment effects as part of the formal ES.

## 9.3 Environmental baseline

### Existing baseline

9.3.1 Baseline data was collated from a variety of sources, including:

- the NHLE (Historic England register of designated heritage assets);
- Derbyshire HER;
- relevant published historical and archaeological literature;
- relevant unpublished archaeological reports;
- conservation area appraisals; and
- historic maps and aerial photography.

9.3.2 In addition to collating documentary baseline data, site visits have been undertaken.

#### *Designated assets*

9.3.3 There are no designated heritage assets located partially or wholly within the land required for the Proposed Scheme.

9.3.4 The following designated heritage assets (listed from south to north) are located partially or wholly within 2km of the land required, temporarily or permanently, for the construction and operation of the Proposed Scheme:

- two scheduled monuments of high value: Section of Rykneld Street Roman road 220m north-east of Pear Tree Farm (NHLE 1021444) and a Section of Rykneld Street 80yds (70m) long N of Redleadmill Brook (NHLE 1007041);
- a Grade II* listed building of high value: Church of Holy Cross (in Morton, NHLE 1335461);
- 28 Grade II listed buildings of moderate value, including six farmhouses or

associated agricultural buildings, a church, two mileposts, a milestone, a war memorial and 17 other domestic, rural and industrial buildings; and

- two conservation areas of moderate value: Morton Conservation Area and Tibshelf Conservation Area.

### *Non-designated assets*

9.3.5 The following non-designated assets of low value lie wholly or partially within the land required for the Proposed Scheme.

- Morton Park (MDR 6055);
- Park Hall (site of?) (MDR 6054);
- Wingfield Mill (site of) (MDR 6056);
- the Midland Railway Pilsley Extension (route of) (MDR 1110);
- the Erewash Valley Line (MDR 12415);
- the original Doe Hill Station and Buildings (site of) (MDR 1105); and
- the later Doe Hill Station Buildings (MDR 1104).

9.3.6 Non-designated heritage assets located partially or wholly within the 500m study area include:

- chapel (site of), Newton Old Hall, Blackwell (MDR 5862) and grave slabs and burials, Newton Old Hall (MDR 5897);
- the Packman's Grave at the intersection of Glove's Lane and Alfreton Road, Tibshelf (MDR 5877); and
- gate pillars at Park House Farm, Pilsley (MDR 6054).

### *Historic environment overview*

9.3.7 Palaeolithic sites and artefacts in the region were generally removed by later glacial action. As a consequence, finds from these periods are generally limited to the river terrace gravels of the River Trent, which lie to the south-east and are outside of the Stonebroom to Clay Cross study area.

9.3.8 Around 9,500BC a period of dramatic environmental change began in Britain. Climatic warming led to a rise in sea levels and a change in vegetation patterns. Open landscapes were replaced by forests of beech and pine, and species such as arctic hare and reindeer gave way to boar and deer. These changes encouraged the development of Mesolithic hunter-gatherer societies, and the subsequent emergence of the early agricultural societies of the Neolithic period.

9.3.9 Mesolithic sites in the East Midlands are often found in areas with well-drained soils and are particularly concentrated within the limestone districts of Derbyshire. However, the underlying geology of the Stonebroom to Clay Cross area is comprised of Pennine Middle and Lower Coal Measure Formations, and no Mesolithic sites are known within the Stonebroom to Clay Cross area. The subsequent Neolithic period

saw the beginning of woodland clearance, a process that gathered pace during the Early Bronze Age which followed. Evidence of Neolithic activity within the study area takes the form of the find-spot of a polished stone axe (MDR 5857).

9.3.10 There is little archaeological evidence for settlement activity in Derbyshire during the Romano-British period. Where it does exist, it is concentrated mainly within the Peak District67. However, the probable route of the Ryknield Street Roman road runs from south to north within the western part of the Stonebroom to Clay Cross area (MDR 10207, MDR 4900, MDR 5031, MDR 5165, MDR 7847). The discovery in Morton of a Romano-British coin hoard (MDR 8464) and findspots of a Romano-British coin (MDR 5150) and a spindle whorl (MDR 5124) in Clay Cross indicate that activity was also taking place within the area during this period.

9.3.11 A recent review of the period between the 5th and 9th centuries has noted 'There are …no excavated settlements in huge areas of Derbyshire and Nottinghamshire. Settlement patterns and material culture in these areas are simply unknown'[68].

9.3.12 From the 11th century onwards, due to the reallocation of land following the Norman Conquest, there was increasing fragmentation of the large estates which had developed during the early medieval period. The smaller holdings which resulted became the framework for land organisation during the medieval period.

9.3.13 The possible site of Park Hall (MDR 6045), a medieval manor house which was home to the Deincourts until the 15th century, is located at Pilsley. A cruck barn and associated outbuilding in Tupton (MDR 5028) has 15th century origins. A water-powered corn mill which was formerly in Wingerworth (MDR 10170) also likely originated in the medieval period. A cross base of possible medieval date was also found in Clay Cross (MDR 5120).

9.3.14 The sites of two medieval parks are also within the Stonebroom to Clay Cross area, Morton Park (MDR 6055) and Shirland Park (MDR 5869).

9.3.15 During the post-medieval period industry developed in the area, principally in the form of coal mining. The prospect of work at the new collieries encouraged people to move into the area. Most were housed in coal estate villages such as Morton, where George Stephenson's Clay Cross Company opened their first colliery in 1865.

9.3.16 The scale of the colliery workings, and the mining villages, railway branches and sidings which developed to service them, fundamentally altered large parts of the local landscape; this activity would also have affected the historic environment, with a resultant widespread loss of buried archaeological remains within these parts of the Stonebroom to Clay Cross area. After the collieries began to close towards the end of the 20th century the landscape began to be returned to agricultural and other industrial uses. Little obvious evidence of the area's mining past has survived, with the exception of the colliery pit-head building in the centre of an industrial estate at Old

[67] Barrett, D, 1998 – 2000a, 'An Archaeological Resource Assessment of Anglo-Saxon Derbyshire', *East Midlands Archaeological Resource Framework*

[68] Vince, A, 'The Anglo-Saxon Period (c.400-850)' in Cooper, N J (ed), 2006, *The Archaeology of the East Midlands: An Archaeological Resource Assessment and Research Agenda*, Leicester Archaeology Monograph No. 13, 161

Colliery Yard, a winding wheel, and some former spoil mounds. Morton Colliery closed in 1965, although mining continued in the wider area until the 1980s.

## 9.4 Effects arising during construction

### Avoidance and mitigation measures

9.4.1 The design of the Proposed Scheme has sought to avoid impacts on heritage assets within the area insofar as reasonably practicable.

9.4.2 Section 8 of the draft Code of Construction Practice (CoCP)[69] sets out the measures that will be adopted, insofar as reasonably practicable, to control effects on heritage assets. These include:

- management measures that will be implemented for heritage assets that are to be retained within the land required for the Proposed Scheme;
- route-wide principles, standards and techniques for works affecting heritage assets; and
- a programme of historic environment investigation and recording (including archaeology and historic buildings) to be undertaken prior to or during construction works affecting the heritage assets.

### Assessment of impacts and effects

#### *Temporary effects*

9.4.3 The construction works, comprising excavations and earthworks and including temporary works such as construction compounds, storage areas, and diversion of existing roads and services, have the potential to affect heritage assets during the construction period. Impacts would occur to assets both within the land required for the Proposed Scheme and to assets in the wider study area as a result of changes to their settings.

9.4.4 No significant effects are expected to occur as a result of temporary impacts on designated and non-designated heritage assets.

#### *Permanent effects*

9.4.5 Permanent significant effects can occur either as a result of physical impacts on heritage assets within the land required for the Proposed Scheme, or through changes to the setting of heritage assets through the presence of the Proposed Scheme.

9.4.6 No significant effects are expected to occur as a result of permanent impacts on designated or non-designated heritage assets.

### Other mitigation measures

9.4.7 No additional construction phase mitigation measures beyond those included within the Proposed Scheme design have been identified at this stage, however potential

[69] Supporting document: Draft Code of Construction Practice

opportunities for further mitigation measures will continue to be considered through detailed design. These may include the identification of:

- suitable locations for advance planting, to reduce impacts on the setting of heritage assets; and
- locations where the physical impacts on below ground heritage assets can be reduced through the design of earthworks.

### Summary of likely residual significant effects

9.4.8 The temporary effects of construction activity on the setting of heritage assets have been considered. However, they are largely reversible in nature and would be restricted to the duration of the construction works.

## 9.5 Effects arising from operation

### Avoidance and mitigation measures

9.5.1 The following measures have been incorporated into the design of the Proposed Scheme, which would reduce the impacts and effects on heritage assets as shown on the CT-06 Map Series within the Volume 2: LA09 Map Book:

- noise mitigation measures have been included within the Proposed Scheme that could reduce potential impacts on some heritage assets; and
- landscape planting could increasingly reduce impacts on the setting of the designated assets within the study area as it matures.

### Assessment of impacts and effects

9.5.2 The assessment considers the Proposed Scheme once operational and all effects are considered to be permanent.

9.5.3 During the operation of the Proposed Scheme no further ground works are anticipated, and as such there would be no further physical impacts on heritage assets arising from the operation of the Proposed Scheme.

9.5.4 Impacts on heritage assets due to changes in their settings arising from the presence of the Proposed Scheme are reported as permanent construction effects and are not repeated in detail here, although they would continue throughout the operation of the Proposed Scheme.

9.5.5 Further effects could occur in relation to heritage assets during the operation of the Proposed Scheme where additional, permanent, changes to the asset's settings have an additional detrimental effect on the way that the asset is understood or appreciated, for example as a result of increased noise or the movement of the trains in combination with the effect of the presence of the Proposed Scheme.

## Other mitigation measures

9.5.6 The Proposed Scheme includes a number of design measures to address potential impacts and significant effects. At this time, no additional operational mitigation measures beyond those included within the Proposed Scheme design have been identified. Potential opportunities for further mitigation have not been identified, and will be considered as part of the detailed design process.

## Summary of likely residual significant effects

9.5.7 As no specific mitigation measures have yet been identified in relation to the heritage assets described above, it is currently anticipated that the residual effects would be the same as those reported in the assessment of effects during operation.

## Monitoring

9.5.8 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme.

9.5.9 No area-specific heritage monitoring requirements during operation of the Proposed Scheme have been identified at this stage.

# 10 Land quality

## 10.1 Introduction

10.1.1 This section of the report presents the baseline conditions that exist along the Proposed Scheme in the Stonebroom to Clay Cross area in relation to land quality, and reports the likely impacts and significant effects identified to date resulting from construction and operation of the Proposed Scheme. Consideration is given to land that potentially contains contamination and land that has special geological significance, either from a scientific, historical, mineral exploitation or mineral resources point of view including geological sites of special scientific interest (SSSI) and local geological sites (LGS), areas of historical mining activity in the context of land quality and areas of designated mineral resources. Consideration is also given to petroleum (including gas) prospects and licensing.

10.1.2 Engagement has been undertaken with the British Geological Survey (BGS), Derbyshire County Council (DCC), Bolsover District Council (BDC), North East Derbyshire District Council (NEDCC), the Environment Agency, Fera Science Ltd (FSL)[70], the Animal and Plant Health Agency (APHA) and the Sheffield Area Geology Trust (SAGT)[71].-The purpose of this engagement has been to discuss the Proposed Scheme and potential effects, and obtain relevant baseline information. Engagement will continue as part of the development of the Proposed Scheme and to inform the formal assessment.

10.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2: LA09 Map Book.

10.1.4 Land contamination issues are closely linked with those involving water resources and waste. Issues regarding groundwater resources are addressed in Section 15, Water resources and flood risk. Issues regarding the disposal of waste materials, including contaminated soils, are addressed in Volume 3: Route-wide effects (Section 15).

## 10.2 Scope, assumptions and limitations

10.2.1 The scope, assumptions and limitations for the land quality assessment are set out in Volume 1, Section 8 and the Scope and Methodology Report (SMR)[72].

10.2.2 In accordance with the SMR, a risk based approach was undertaken to identify contamination that may have an impact upon the construction of the Proposed Scheme. To support this, a desk based assessment has been undertaken for the study area, defined as the land required for the construction of the Proposed Scheme plus a 250m buffer. In the case of groundwater abstractions this buffer is increased up to 1km.

[70] Formerly known as the Food and Environment Research Agency
[71] Formerly known as the South Yorkshire RIGS Group
[72] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

10.2.3 The majority of new and diverted utilities would be laid in the boundaries of existing highways within normal road construction layers and natural soils below. These have been considered in the context of the conceptual site model (CSM) approach, and the lack of contact with nearby potentially contaminated sites, and the absence of sensitive receptors within the roadways reduces the risk of an impact occurring to very low levels. The impact of laying these new and diverted utilities has therefore been scoped out of the assessment as they are unlikely to cause any significant land quality effects.

10.2.4 Potentially contaminated areas of land have been identified that could affect, or be affected by, the construction of the Proposed Scheme (e.g. contaminated soils may need to be removed or construction may alter existing contamination pathways). Each of these areas has been studied to evaluate the scale of potential impacts caused by existing contamination (if present) and what needs to be done to avoid significant consequences to people and the wider environment.

10.2.5 The location of the Proposed Scheme was viewed from points of public access initially. In addition, visits to some key sites have been undertaken to verify desktop information.

10.2.6 A CSM approach has been used to provide an understanding of the types of contaminants that may be present, the likely sources and/or pathways by which contamination can spread and the potential receptors (i.e. people and the wider environment) that could be affected. It indicates the types of impacts that existing contamination may be having at present and may have during and after construction.

10.2.7 The minerals assessment is based upon the minerals resources[73] identified on published mineral plans, and existing planning or licensed areas. Any inference of minerals provided by geological maps/reports is excluded (except where these are covered by the DCC Minerals Plan).

10.2.8 The geo-conservation assessment is based upon publically available local geological trust records.

## 10.3 Environmental baseline

### Existing baseline

10.3.1 Baseline data has been collected from a range of sources including Ordnance Survey mapping, BGS, DCC, BDC, NEDCC, Coal Authority, Public Health England (PHE), the Environment Agency, Natural England, FSL and the APHA records, as well as publicly available sources such as local geological trusts and mineral plans.

[73] Defined in the SMR as "mineral body including aggregates, salt, coal and other hydrocarbons, Petroleum Extraction Development Licences (PEDLs), Shale Prospective Areas (SPAs)"

## *Geology*

10.3.2 This section describes the underlying ground conditions within the Stonebroom to Clay Cross area. Recent changes in lithostratigraphic classifications by the BGS have been incorporated where appropriate[74].

10.3.3 Table 11 provides a summary of the geology (made ground, superficial and bedrock units) underlying the Proposed Scheme within the Stonebroom and Clay Cross area.

Table 11: Summary of the geology underlying the Stonebroom to Clay Cross area

| Geology | Distribution | Formation description | Aquifer classification |
|---|---|---|---|
| **Made ground** | | | |
| Made ground | Frequently associated with coal mining, both from backfilled and restored former open cast workings and shallow and deep underground working at Morton and Clay Cross collieries. Likely also associated with historical and contemporary industrial land use. | Artificial ground comprising variable deposits of reworked natural and man-made materials | Not classified |
| **Superficial** | | | |
| Alluvium | Along water courses crossing the study area. | Clay, silt, sand and gravel | Secondary A |
| **Bedrock** | | | |
| Pennine Middle Coal Measures | In the central and south-eastern part of the study area, from the southern extent to where the route of the Proposed Scheme would cross the River Rother. | Alternate beds of mudstone and sandstones, containing five coal seam outcrops and the Top Hard Rock sandstone. | Secondary A |
| Pennine Lower Coal Measures | In the north and western part of the study area, from where the route of the Proposed Scheme would cross the River Rother to the northern extent of the study area. | Alternate beds of mudstone and sandstones containing three coal seam outcrops and the Deep Hard Rock sandstone. | Secondary A |

### Made ground

10.3.4 Made ground is a term used to denote man-made deposits such as landfill, colliery spoil heaps or earthworks associated with construction or ground improvement. Such deposits may be poorly mapped and are often very variable in composition. Minor deposits of made ground may be encountered within the Stonebroom to Clay Cross area, for example where ponds or pits have been backfilled. There is evidence of historical and authorised landfill waste disposal within the Clay Cross area which may comprise greater deposits of made ground.

[74] British Geological Survey, (2014), *A lithostratigraphical framework for the Carboniferous successions of southern Great Britain (onshore). Research Report RR/09/01.* Available online at: http://nora.nerc.ac.uk/id/eprint/8281/1/RR09001.pdf

10.3.5 Areas of former open cast coal workings have been identified in the area. These have been backfilled and restored for continued agricultural usage or public open space. Such areas include the former Doe Hill open cast colliery which has been restored to create the Doe Hill Community Park, and the former Rainge open cast area, which has been restored for agriculture.

10.3.6 The former site of the Morton Colliery deep colliery has been partly redeveloped as an industrial estate. A community woodland is located on the extensive colliery spoil deposits, adjacent to the land required for the construction of the Proposed Scheme.

10.3.7 No known farm burial or pyre sites associated with the 2001 or 1967 outbreak of foot and mouth disease (FMD) are known to be present within the Stonebroom to Clay Cross study area. The APHA Foot and Mouth Disease County Status Maps[75] identify that Derbyshire was reported as free of FMD during the 2001 outbreak. It should be noted that small scale burial of animals cannot fully be discounted within any rural setting, and future stages of land owner consultation or record review could identify such features. Similarly, anthrax-infected cattle burials may be present, generally relating to burials 50 to 100 years ago. However, no records have been found of such burials.

### Superficial geology

10.3.8 Alluvial deposits variably comprising clay, silt, sand and gravel occur along the courses of streams and rivers. Alluvium is present in the study area associated with the River Rother and Morton Brook and their tributaries.

### Bedrock geology

10.3.9 The bedrock geology in the study area comprises the Pennine Middle Coal Measures and Pennine Lower Coal Measures. Both contain interbedded mudstone, siltstone and sandstone layers, commonly with coal seams.

10.3.10 The boundary between the two formations is marked by the Vanderbeckei Marine Band, a fossiliferous blue shale with bands of decomposed mudstone and shale. The Proposed Scheme would cross the boundary in the vicinity of Padleywood Farm.

10.3.11 The southern part of the study area, south of Padleywood Farm, is underlain by the Pennine Middle Coal Measures. There are five historically worked coal seams that outcrop broadly from east to west along the route of the Proposed Scheme in this area as summarised below:

- Top Hard;
- Dunsil;
- First Waterloo;
- Second Waterloo; and
- Second Ell coal seams.

[75] *APHA Foot and Mouth Disease County Status Maps* Available online from https://data.defra.gov.uk/Agriculture/APHA0704-FMD_County_Status_20011029.jpg

10.3.12 To the north of Padleywood Farm, the remainder of the route of the Proposed Scheme in this area is underlain by the Pennine Lower Coal Measures, crossing the outcrop of three worked coal seams as summarised below:

- Clay Cross Soft Coal;
- Deep Soft Coal; and
- Deep Hard Coal seams.

**Radon**

10.3.13 Radon is a radioactive gas formed by the radioactive decay of naturally occurring uranium in rocks and soils. The occurrence of radon gas is shown in the BGS Radon Potential Dataset[76]. This indicates a range of radon potential throughout the Stonebroom to Clay Cross area.

10.3.14 In the southern extent of the study area, between 5% and 10% of homes are estimated to have radon levels at or above the action level of 200 becquerels per cubic metre of air (Bq/m$^3$) for residential properties between Newton and the B6025 Alfreton Road. In the Stonebroom and Morton areas, between 1% and 3% of homes are estimated to have radon levels at or above the action level, reducing to <1% of homes between Padleywood Farm and Danesmoor.

10.3.15 The formal ES will include an assessment of areas where 5% and over of homes are estimated to have radon levels at or above the action level of 200 Bq/m$^3$.

### *Groundwater*

10.3.16 Secondary A aquifers have been identified within the study area, as defined by the Environment Agency, namely:

- alluvium; the Pennine Lower Coal Measures; and
- the Pennine Middle Coal Measures.

10.3.17 The Environment Agency reports that there are no groundwater abstraction licences located within 1km of the land required for the construction of the Proposed Scheme.

10.3.18 There are no groundwater source protections zones (SPZ)[77] identified within the study area.

10.3.19 Details of licensed abstractions are provided in Section 15, Water resources and flood risk. It should be noted that all abstractions that are used directly or indirectly for human consumption are by default designated as SPZ. In such cases the abstraction point qualifies for a default 10m radius for SPZ1 and a default 250m radius for SPZ2. There is no default SPZ3 for total catchment with respect to this type of abstraction.

[76] Available at: http://www.bgs.ac.uk/radon/hpa-bgs.html This dataset underpins Public Health England's Indicative Atlas of Radon in England and Wales (Miles J.C.H, Appleton J.D, Rees D.M, Green B.M.R, Adlam K.A.M and Myers, A.H. (2007). Indicative Atlas of Radon in England and Wales. Public Health England. ISBN: 978-0-85951-608-2. 29 pp) available at www.ukradon.org/information/ukmaps.

[77] A groundwater SPZ is a defined area within which groundwater is extracted for potable water supply. The area is defined by the Environment Agency on the basis of the length of time taken for groundwater to migrate to the potable source.

10.3.20 There are no licensed or recorded private groundwater abstractions registered within the study area. There are no Drinking Water Safeguarding Zones in the Stonebroom to Clay Cross area.

10.3.21 Further information on the groundwater in the Stonebroom to Clay Cross area is provided in Section 15, Water resources and flood risk.

10.3.22 Coal Authority information indicates that pumping to control groundwater levels occurred at Morton Colliery following closure until the end of 1999. Seven lagoons were formed on the former colliery spoil heaps to manage pumped water. It is not known whether monitoring of groundwater levels post-cessation of pumping occurred, or what the current groundwater levels are at the site. Further liaison with the Coal Authority and Environment Agency is required in this respect.

### *Surface water*

10.3.23 The Proposed Scheme would intersect the following watercourses. The Water Framework Directive (WFD) designation of each watercourse is shown in brackets:

- Morton Brook and four unnamed tributaries (Ordinary Watercourse);
- Westwood Brook and two unnamed tributaries (Ordinary Watercourse);
- River Rother and three unnamed tributaries (Ordinary Watercourse); and
- Love Lane Drain 1, 2 and 3 (Minor Ditches).

10.3.24 There are 10 active discharge consents to surface water within the study area, related to public and private sewage discharge and trade effluent.

10.3.25 There are no licensed surface water abstractions located within the study area.

10.3.26 No private water supplies from surface water sources have been identified in the study area. However, as there is no obligation to register private water supplies, there may be unrecorded abstractions near to the route.

10.3.27 Further information on surface water in the Stonebroom to Clay Cross area is provided in Section 15, Water resources and flood risk.

### *Current and historical land use*

10.3.28 Current potentially contaminative land uses within the study area include: two waste water treatment works, a mixed use industrial estate, two scrapyards, the existing Erewash Valley Line, an oil/ fuel distribution depot, and several farms.

10.3.29 Historical land uses identified within the study area with the potential to have caused contamination include several former open cast coal and shallow coal workings (at <30m depth), two underground collieries with associated colliery spoil heaps, railway, coal gasification and engineering activities) and one landfill. Infilled pits and ponds may have been filled with a variety of waste materials, but have not been licensed.

10.3.30 Further details of these current and historical contaminative land uses within the study area are shown in Table 12, Table 13 and Table 14.

Table 12: Current and historical landfill sites located in the study area

| Name and area reference[78] | Location | Description |
|---|---|---|
| Pit Lane landfill, Danesmoor (closed) (LA09-4579) | South-west of Danesmoor, adjacent and west of Erewash Valley line | Active in the mid-1980s, reported by the Environment Agency to have received inert materials. Date of last waste deposit not currently known. No record of licence or licence surrender. |

Table 13: Current and historical mining, mineral sites and colliery spoil sites located in the study area

| Name and area reference | Location | Description |
|---|---|---|
| Former Morton Colliery (LA09-4576) | North of Morton off the B6014 Doe Hill Lane | Former colliery operating between 1865 and 1965. Extensive colliery spoil heaps, now vegetated and woodland. No information is available regarding the type of fill material used. The site is has no waste management or landfill records. Former mine water management lagoons are present. Additional potential contamination sources associated with the colliery include engineering works, mineral railway line and sidings, and a possible small-scale coal gas generation plant with gasometer. Three historical shafts are shown to be present on site. |
| Former Rainge open cast workings (LA09-4592) | South of Danesmoor, west of the Erewash Valley Line | Possible extensive open cast workings apparent on historical map data. Backfill or restoration details have not been identified. The sites are not featured within waste management and landfill records. Two historical adits are shown to be present on site. |
| Former Doe Hill, Love Lane, Tibshelf open cast workings (LA09-4596, 4595) | South of theB6014 Doe Hill Lane, approximately 50-75m west of Alfreton Lane and 500m south-west of Tibshelf | Extensive filling and restoration of former open cast sites as Doe Hill Community Park. The site is reported to have been backfilled with excavated overburden (arisings) from the open cast workings, and landscaped with subsoil and topsoil upon completion of operations. Other co-located open cast sites include Love Lane and Tibshelf open cast workings. |
| Former Banks Farm open cast workings (LA09-5027) | Approximately 300m west of Newton | Extensive filling and restoration of former open cast site. Information regarding the characteristics has not been identified. The site is not featured within waste management and landfill records. |
| Former Mount Pleasant open cast workings (LA09-4549 & 4551) | Approximately 80m south of the Proposed Scheme, 50-75m west of Alfreton Road, Newton | Extensive filling and restoration of former open cast site. Information regarding the characteristics of the fill material for the former open cast site has not been identified. The site is not featured within waste management and landfill records. |
| Former Parkhouse Colliery (Clay Cross Colliery) (LA09-4585) | Located partly within the land required for the Proposed Scheme, east of Danesmoor | Former colliery operating between 1877 to 1969.Site appears to have been restored to farmland with no apparent remnant features. The site is not featured within waste management and landfill records. Two historical shafts are shown to be present on site. |
| Probable and unlicensed coal workings, associated shafts, adits and spoil disposal.<br><br>(Shallow coal mining LA09 – 4536, 4605, | Proposed Scheme intersects throughout the south-east and northern extents of the study area. | Coal Authority data suggest extensive probable and unlicensed coal working, which suggests that coal is likely to have been worked by underground and open cast methods at some time in the past but no definitive records exist. Fourteen historical shafts and adits are shown to be present within these areas. |

[78] Each potentially contaminated site is allocated a unique reference number.

| Name and area reference | Location | Description |
|---|---|---|
| 4609, 4614, 4616, 4619, 5029, 5030, 5031, 5032, 5033, 5035, 5036, 5037, 5038, 5043, 5044, 5046 & 5047)<br><br>(Open cast coal mining LA09 – 4562, 4568, 4586, 4590, 4591, 4594, 4596 & 5027) | | |

Table 14: Current and historical industrial sites located in the study area

| Name | Location | Description |
|---|---|---|
| Oil/ fuel distribution depot (LA09-4552) | **Located within the land required for the Proposed Scheme on the B6014 Doe Hill Lane** | **Active oil storage and road tanker distribution depot with large scale storage of unidentified hydrocarbon product.** |
| Scrapyard (LA09-4571) | Adjacent to the west of the Proposed Scheme between Erewash Valley line and | Scrapyard located adjacent to the route of the Proposed Scheme, in use from 1970 to present day. |
| Industrial estate and scrapyard (LA09-4572) | 225m south-west of the Proposed Scheme, north of Morton off the B6014 Doe Hill Lane | Industrial estate and road vehicle scrapyard within former colliery boundary. |
| Waste water treatment works (LA09-4528, 4569, 4550, 4541) | Three sites located at Danesmoor, Stonebroom and Newton. | Two operational and two historical sewage treatment plants, with potential for extensive made ground, sewage sludge, ground gas potential, power transformation, maintenance workshops and sewage screenings disposal. |
| Industrial estate and scrapyard (LA09-4572) | The track bed and embankments of the existing Erewash Valley Line, and historical former mineral railways/ sidings. | Potential contamination associated with contemporary and historical mineral and mainline railway use. Embankments could include potentially contaminated materials. |

10.3.31 Contaminants commonly associated with sites in Table 12, Table 13 and Table 14.

10.3.32 Table 12, Table 13 and Table 14 could include metals, semi-metals, asbestos, organic and inorganic compounds. Additionally, infilled areas, pits and landfills could also give rise to landfill gases such as methane or carbon dioxide, and leachate.

10.3.33 Additional contaminants associated with mining and mineral sites identified in Table 13 could include acid mine waters with low pH values and mine gases such as methane, carbon dioxide and hydrogen sulphide.

10.3.34 Additional contaminants associated with the waste water treatment works identified in Table 14 could include pathogens and ground gases from disposal of sewage derived sludges.

### *Other regulatory data*

10.3.35 The regulatory data reviewed included pollution incidents (major, significant and minor categories), radioactive and hazardous substances consents and environmental permits (previously landfill, integrated pollution control and integrated pollution prevention and control licences).

10.3.36 There were seven pollution incidents between 1993 and 2018 within the study area related to mining water discharge, discharges related to sewage treatment, chemical release from industry and other miscellaneous pollutants including agricultural discharge to the River Rother and its tributaries.

10.3.37 One major pollution incident to water (Category 1) occurred within the study area in November 2003, and was associated with the release of organic chemicals (inks and dyestuffs) into the River Rother from industry in Danesmoor.

10.3.38 The remainder of pollution incidents to controlled waters were classified as Category 3 relating to ochre discharge to surface waters associated with coal mining in 1996 and 1998, and discharge of sewage waters from the Danesmoor waste water treatment works in 1993.

10.3.39 There are no consented discharges to groundwater within the study area.

10.3.40 There are six consented discharges to surface water within the study area, one of which is within the land required for the Proposed Scheme. This is reported as being for discharge of site drainage at the Doe Hill oil/fuel distribution depot into the River Amber catchment.

10.3.41 There are no Control of Major Accident Hazards (COMAH) sites present in the study area.

10.3.42 There are no nationally significant ecological designations, as defined in the land quality section of the SMR[79], located within the study area. Local Wildlife Sites (LWS), watercourses and water bodies are present within the Stonebroom to Clay Cross area. There is also one area of Ancient Woodland within the study area at Padley Wood, which lies within the land required for the Proposed Scheme. These could represent potential receptors to land contamination.

### *Mining/ mineral resources*

10.3.43 There are a range of mining and mineral resources located within the study area that have the potential to be affected by the Proposed Scheme. These can include sand, gravel, clay, stone and coal, which can be protected via local or county level mineral plans and by the Coal Authority, as well as other forms of petroleum hydrocarbons such as shale gas and oil which are regulated by the Oil & Gas Authority (OGA) via the issue of Petroleum Exploration Development Licences (PEDLs).

[79] Sensitive ecological receptors are defined as national designations such as SSSIs.

### Mineral plans

10.3.44 DCC is responsible for the overall mineral and waste local plans for the county. The Minerals Local Plan (MLP) for Derbyshire (2000) [80] was adopted in April 2000 (amended 2002) and sets out the DCC policies aimed at controlling mineral related developments within Derbyshire.

10.3.45 Consultations with DCC in 2014[81] identified a number of minerals within Derbyshire requiring consideration. In respect of the Stonebroom to Clay Cross area, surface mining of coal was reported in the east of the county by this consultation, where the potential for future applications for surface coal extraction was not discounted.

### Sand, gravel and clay deposits

10.3.46 DCC, Derby City Council and the Peak District National Park Authority have completed a local aggregate assessment, most recently published in The Local Aggregate Assessment 2016[82]. This does not identify aggregate sites within the Stonebroom to Clay Cross area.

10.3.47 There are no reported mineral safeguarding areas (MSA) within the study area. However, the consultation with DCC in 2014[83] stated the emerging minerals plan will safeguard limestone, surface coal and sand and gravel resources at a county level, and an MSA for surface coal within the study area is proposed. Therefore, it is assumed the area required for the construction of the Proposed Scheme in the Stonebroom to Clay Cross area will be within an MSA for surface coal.

### Coal mining

10.3.48 The majority of the Stonebroom to Clay Cross area is underlain by the Pennine Middle Coal Measures and the Pennine Lower Coal Measures. The coal seams throughout the coal measures have been subject to extensive historical to recent open cast, shallow and deep mining. Localised mining of ironstone and fireclay has also taken place within the coal measures, frequently associated within open cast coal sites.

#### *Open cast coal mining*

10.3.49 Although there are no reported mineral safeguarding areas (MSA) within the study area, the previous consultation with DCC stated that an MSA for surface coal within the study area is proposed, which has the potential to be exploited by opencast methods. The consultation states that minerals of economic importance should be taken into account in the assessment of applications for non-mineral development to avoid their needless sterilisation. As such, surface coal reserves have been considered within this assessment.

[80] Derby and Derbyshire Minerals Local Plan, Derbyshire County Council (2000). *Adopted Edition April 2000. Incorporating First Alteration: Chapter 13-Coal November 2002*
[81] HS2 Consultation Response Appendix D January 2014 downloaded from https://www.derbyshire.gov.uk/site-elements/documents/pdf/transport-roads/public-transport/news-notices/hs2/appendix-d-details-of-mineral-sites.pdf
[82] Derbyshire County Council, Derby City Council & The Peak District National Park Authority Local Aggregate Assessment 2016
[83] HS2 Consultation Response Appendix D January 2014 downloaded from https://www.derbyshire.gov.uk/site-elements/documents/pdf/transport-roads/public-transport/news-notices/hs2/appendix-d-details-of-mineral-sites.pdf

*Deep coal mining*

10.3.50 Geological mapping from the BGS shows that coal seams are present at depth beneath the entire study area and have the potential to be exploited in the future, for both coal and coal bed methane. However, the DCC consultation undertaken for the Proposed Scheme does not refer to deep coal reserves.

**Petroleum exploration and development licence (PEDL/hydrocarbons)**

10.3.51 The Stonebroom to Clay Cross area is within PEDL areas 299 and 303 offered within the 14th Onshore Oil and Gas Licensing Round in 2014[84]. As such, it is considered that the study area is within an area where hydrocarbon resources, including coal bed methane, could be identified and extracted in the future.

### *Geo-conservation resources*

10.3.52 No geological SSSI or LGS sites have been identified within the study area. Therefore, no assessment of geo-conservation resources has been undertaken.

### *Receptors*

10.3.53 The sensitive receptors that have been identified within the study area are summarised in Table 15. A definition of receptor sensitivity is given in the SMR.

Table 15: Summary of sensitive receptors

| Issue | Receptor type | Receptor description | Receptor sensitivity |
|---|---|---|---|
| Land contamination | People | Residents at existing properties, occupants and users of schools, play areas, parks and public open space | High |
| | | Users of allotments, commercial areas, retail parks, hotels | Moderate |
| | | Users of industrial land | Low |
| | Groundwater | 'Secondary A' superficial and bedrock aquifers within alluvium, the Pennine Middle and Pennine Lower Coal Measures | Moderate |
| | Surface waters[85] | Morton Brook and unnamed tributaries (WFD status: moderate) | Moderate |
| | | Westwood Brook and unnamed tributaries (WFD status: moderate) | Moderate |
| | | River Rother and unnamed tributaries (WFD status: poor) | High |
| | | Love lane Drains (WFD status: poor and moderate) | Low |
| | Natural environment | Local Wildlife Sites (LWS), Padley Wood Ancient Woodland Inventory Site, watercourses and water bodies within the land required for the Proposed Scheme. | Moderate |

[84] Department for Energy and Climate Change, Oil and Gas Authority,14th Onshore Oil and Gas Licensing Round
[85] The WFD classifications and sensitivity of surface water as presented in Section 15, Water resources and flood risk have been used to determine sensitivity to in respect of Land Quality

| Issue | Receptor type | Receptor description | Receptor sensitivity |
|---|---|---|---|
| Impacts on mining/mineral and petroleum (gas) sites (severance and sterilisation) | Mining/ mineral sites | Mineral safeguarding areas for surface coal<br><br>Hydrocarbon resources (PEDL areas 299 and 303) | Moderate<br><br>High |

## 10.4 Effects arising during construction

### Avoidance and mitigation measures

10.4.1 The construction assessment takes into account the mitigation measures described in the draft Code of Construction Practice (CoCP)[86]. The draft CoCP sets out the measures and standards of work that would be applied to the construction of the Proposed Scheme and includes requirements to ensure the effective management and control of work in contaminated areas.

10.4.2 The requirements in the draft CoCP relating to work in contaminated areas would ensure the effective management and control of the work. These requirements include:

- methods to control noise, waste, dust, odour, gases and vapours (Sections 5, 7, 11, 13, 14 and 15);
- methods to control spillage and prevent contamination of adjacent areas (Sections 5, 11 and 16);
- the management of human exposure for both construction workers and people living and working nearby (Sections 5, 7 11, 13 and 14);
- methods for the storage and handling of excavated materials (both contaminated and uncontaminated) (Sections 6, 7, 11 and 15);
- management of any unexpected contamination found during construction (Sections 11 and 15);
- a post-remediation permit to work system (Section 11);
- storage requirements for hazardous substances such as oil (Sections 5, 11 and 16);
- traffic management to ensure that there is a network of designated haul routes to reduce compaction/degradation of soils (Section 5, 6 and 14);
- methods to monitor and manage flood risk and other extreme weather events which may affect land quality during construction (Section 5 and 16); and
- methods to manage discovery of unknown animal burial pits (Section 6).

10.4.3 The draft CoCP would require that prior to and during construction, a programme of further detailed investigations, which may include both desk based and site based

[86] Supporting document: Draft Code of Construction Practice

work, takes place in order to confirm the full extent of areas of contamination. It also requires a risk assessment to be undertaken to determine what, if any, site specific remediation measures are required to allow the Proposed Scheme to be constructed safely and to prevent harmful future migration of contaminants. The investigation and assessment of potentially contaminated sites would be undertaken in accordance with Environment Agency CLR11[87] and British Standards BS10175[88] and BS8576[89].

10.4.4 Where significant contamination is encountered, a remedial options appraisal would be undertaken to define the most appropriate remediation techniques. Where appropriate, this appraisal would be undertaken based on multi-criteria attribute analysis that considers environmental, resource, social and economic factors in line with the framework set out by the Sustainable Remediation Forum UK[90]. The preferred option would then be developed into a remediation strategy.

10.4.5 Contaminated soils excavated within the site, where practicable, would be treated to remove or render contamination inactive and reused within the Proposed Scheme where needed and suitable for use. Treatment techniques are likely to include stabilisation, soil washing and bio-remediation. Contaminated soil removed off-site would be taken to a soil treatment facility, another construction site (for treatment and reuse) or to an appropriately permitted landfill.

## Assessment of impacts and effects

10.4.6 Construction of the Proposed Scheme in this area would require earthworks, utility diversions, deep foundations, grouting and ground stabilisation and other activities, including the construction of the various viaducts and road infrastructure works. These aspects of the Proposed Scheme, along with other construction features, are shown on the Map Series CT-05 in the Volume 2: LA09 Map Book.

### *Land contamination*

10.4.7 In line with the assessment methodology, as set out in the SMR, an initial screening process has been undertaken to identify areas of current or historical contaminative use within the study area and to consider which of these areas might pose contaminative risks for the Proposed Scheme. Sites that present a low risk have not been taken further in the assessment. Any moderate to higher risk sites have been taken forward to more detailed risk assessments, in which the potential risks are assessed more fully. The majority of the areas that have undergone the more detailed risk assessments are historical or current landfills, industrial, mining and commercial sites.

10.4.8 CSMs have been produced for those areas taken to detailed risk assessments. The following factors determine the need for detailed risk assessments:

- whether the site is located on or off the route of the Proposed Scheme or associated off line works;

[87] Environment Agency, (2004), *CLR11 Model Procedures for the Management of Land Contamination*
[88] British Standard (2011); BS10175+A2:2017 Investigation of Potentially Contaminated Sites
[89] British Standard, (2013) *BS8576 Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)*
[90] Sustainable Remediation Forum UK, (2010), *A Framework for Assessing the Sustainability of Soil and Groundwater Remediation*

- the vertical profile of the route;
- the presence of underlying sensitive groundwater aquifers (Principal or Secondary A) or nearby watercourses; and
- the presence of adjacent residential properties or sensitive ecological receptors.

10.4.9 Clusters of potentially contaminated sites of a similar nature have been grouped, and assessed together, where appropriate.

10.4.10 A simple summary of the baseline CSM is provided in Table 16. The potential impacts and baseline risks quoted are those before any mitigation is applied. The assessed baseline risk is based on the information provided at the time of the assessment. Where limited information is available, the assessment is based on precautionary, worst case assumptions and may therefore report a higher risk than that which actually exists. A screening assessment of the effects of contamination has been completed by comparing the detailed CSM developed for potential contaminated areas at baseline with construction and post-construction stages.

Table 16: Summary of baseline CSM for sites which may pose a contaminative risk for the Proposed Scheme

| **Area reference**[91] | **Area name** | **Human health risk** | **Groundwater risk** | **Surface water risk** | **Ecosystem risk** | **Buildings risk** |
|---|---|---|---|---|---|---|
| On site[92] | | | | | | |
| LA09-4520 | Padleywood Farm | Low to moderate | Low | Low | Very low | Low to moderate/low |
| LA09-4579 | Pit Lane landfill, Danesmoor | Moderate/low | Moderate | Moderate | N/A | Low to moderate |
| LA09-4552 | Doe Hill Lane fuel depot tanks | Moderate/low to moderate | Moderate | Moderate/low | N/A | Low to moderate/low |
| LA09-4515, 4543, 4546, 4547, 4556 | Multiple railway and historic disused railway mineral lines | Very low to moderate/low | Low | Low | N/A | Very low to moderate/low |
| LA09-4620 | Industrial production and processing sites | Low to moderate | Low | Moderate/low | N/A | Low to moderate/low |
| LA09-4571 | Scrapyard | Very Low to moderate | Moderate/low | Moderate/low | N/A | Very low to moderate |
| LA09-4517 & 4538 | Depots and distribution facilities | Low to moderate | Very low | Very low | N/A | Very low to moderate |

[91] Each potentially contaminated site is allocated a unique reference number
[92] 'On site' is within the area of land required for construction of the Proposed Scheme

| Area reference[91] | Area name | Human health risk | Groundwater risk | Surface water risk | Ecosystem risk | Buildings risk |
|---|---|---|---|---|---|---|
| LA09 – 4536, 4605, 4609, 4614, 4616, 4619, 5036, 5037, 5043 & 5044 | Shallow coal mining | Very Low to moderate | Moderate/low | Moderate/low | N/A | Very low to moderate |
| LA09 – 4562, 4568, 4586, 4590, 4591, 4592, 4595, 4596 & 5027 | Open cast coal mining | Very low to moderate/low | Moderate/low | Moderate/low | N/A | Very low to moderate/low |
| LA09-4569 | Active waste water treatment works including filter beds at Danesmoor. | Low to moderate | Low | Low | N/A | Low to moderate |
| LA09–4576, 4585 | Former Morton Colliery (including industrial estate) and former Clay Cross colliery | Very low to moderate/low | Moderate/low | Moderate/low | N/A | Very low to moderate |
| Off site[93] | | | | | | |
| LA09-4575 | Multiple railway and historic disused railway mineral lines | Very low to moderate/low | Low | Low | N/A | Very low to moderate/low |
| LA09 –4594 | Open cast coal mining | Very low to moderate/low | Moderate/low | Moderate/low | N/A | Very low to moderate/low |
| LA09 –5029, 5030, 5031, 5032, 5033,5035, 5036, 5038, 5046 & 5047 | Shallow coal mining | Very low to moderate | Moderate/low | Moderate/low | N/A | Very low to moderate |
| LA09-4523 | Industrial production and processing sites | Low to moderate | Low | Moderate/low | N/A | Low to moderate/low |
| LA09–4572 | Former Morton Colliery and associated activities and co-located industrial estate | Very low to moderate/low | Moderate/low | Moderate/low | N/A | Very low to moderate |

[93] 'Off site' is beyond the land required for construction of the proposed scheme but within 250m of it

### Temporary effects

10.4.11 In order to identify potential temporary effects, the baseline and construction CSM have been compared to determine the change in level of risk at receptors during the construction stage, and thus to define the level of effect at the construction stage.

10.4.12 Where there is no change between the main baseline risk and the main construction risk, the temporary effect significance is deemed to be negligible even if the risk is deemed to be high. For example, this would be the case where the construction of the Proposed Scheme does not alter the risks from an existing potentially contaminated site that is outside the area required for construction.

10.4.13 A worsening risk at construction stage compared to baseline would result in a negative effect, and conversely, an improvement would result in a positive effect. The assessment assumes that contamination would be controlled through the general measures in the draft CoCP. Once updated, this would also include mining related contamination.

10.4.14 All of the sites set out in Table 16 have been assessed for the change in impact associated with the construction stage of the work. Table 17 presents the summary of the resulting construction effects that have been found to be significant. All other sites referenced in Table 16 were found to have non-significant effects.

Table 17: Summary of construction CSM effects

| Name and area reference[94] | Receptor | Main baseline risk | Main construction risk | Temporary effect |
|---|---|---|---|---|
| LA09 – 4536, 4605, 4609, 4614, 4616, 4619, 5029, 5030, 5031, 5032, 5033, 5035, 5036, 5037, 5038, 5043, 5044, 5046 & 5047 Shallow coal mining | Human health (inhalation of ground gases off site) | Moderate/ low | High | Moderate adverse effect (significant) |
| | Controlled water receptors - Groundwater | Low | Moderate | Moderate adverse effect (significant) |
| | Controlled water receptors – Surface water | Low | Moderate | Moderate adverse effect (significant) |

10.4.15 In the event that unexpected contamination is encountered during the construction of the route in this area, this would be remediated as described in the draft CoCP resulting in an overall beneficial effect.

10.4.16 Table 17 indicates that there are 21 locations where there would be a significant adverse effect, and no significant beneficial effects.

[94] Each potentially contaminated site is allocated a unique reference number

10.4.17 The extent to which mine water and mine gas is controlled is subject to ongoing investigation. For mining sites, potential for significant adverse effects has been identified associated with mine gas and mine water in historical workings. Any mitigation measures required will be identified, in consultation with authoritative consultees, including measures to be set out in the draft CoCP, to mitigate any significant effects.

10.4.18 Construction compounds located in this study area could include the storage of potentially hazardous substances, such as fuels and lubricating oils, and may also be used for temporary storage of potentially contaminated soils. Mitigation measures set out within the draft CoCP include management of risks from the storage of such materials resulting in no significant effects.

### Permanent effects

10.4.19 In order to identify potential permanent effects, a screening assessment has been undertaken comparing the baseline and post-construction CSM to assess the permanent (post-construction) effects.

10.4.20 The magnitude of the permanent effects and their significance have been determined by assessing the change in risk between the main baseline risk and the main post-construction risk. Therefore, where there is no change between the main baseline risk and the main post-construction risk, the permanent effect significance is deemed to be negligible even if the risk is assessed to remain as high. This would be the case where the construction of the Proposed Scheme would not alter the risks from an existing potentially contaminated site that is outside the construction boundary. As noted above, a worsening would result in negative effects and an improvement would result in positive effects.

10.4.21 All of the sites set out in Table 16 have been assessed for the change in impact associated with the permanent post-construction stage. No sites were found to have significant effects.

10.4.22 In relation to the potential significant effects associated with mining sites at construction stage, there will be a greater level of knowledge and understanding of the mine workings ground model and the best means to mitigate the potential effects on a permanent basis.

10.4.23 Additional site-specific permanent remediation measures, that could focus on source removal, pathway breakage or receptor protection, would be developed during the detailed design stage if required. These measures would ensure that risks to people, surface waters and property from gas and vapours in the ground, a further principal risk in this area, would be controlled to an acceptable level.

#### *Mining/mineral resources*

10.4.24 Construction of the Proposed Scheme has the potential to affect existing mineral resources and proposed areas of mineral exploitation. This could occur by sterilisation of the resource through direct excavation during construction of the Proposed

Scheme or through temporary and/or permanent severance[95] or isolation that may occur during the construction phase of the Proposed Scheme, possibly continuing through to its operation.

10.4.25 The route of the Proposed Scheme would cross a proposed MSA for surface coal extraction.

### Temporary effects

*Coal mining*

10.4.26 As there are no currently worked opencast sites or deep mines within the study area, there are no effects on coal mining. There are currently no known plans for future opencast sites.

*Petroleum exploration and development licence (PEDL/hydrocarbons)*

10.4.27 The route of the Proposed Scheme would cross an area underlain by PEDL areas. The effect of construction of the Proposed Scheme on these would be negligible. The construction of the Proposed Scheme would be unlikely to place a constraint on future exploitation of potential sources of shale gas. The resource is potentially present, deep underground, and would remain accessible across the licenced area.

### Permanent effects

*Coal mining*

10.4.28 The majority of effects on potential future mining and mineral sites would be permanent. The effects of construction of the Proposed Scheme on the proposed MSA for surface coal would be permanent where parts of the MSA would be beneath the footprint of the permanent works, with a strip of mineral becoming sterilised. However, in the Stonebroom to Clay Cross area the Proposed Scheme would largely be constructed adjacent and in parallel to the existing Erewash Valley Line, or through restored, former open cast (surface) coal mining areas.

10.4.29 Given the presence of the existing Erewash Valley Line, open cast (surface) coal workings are considered to be sterilised beneath this section of the Proposed Scheme in the Stonebroom to Clay Cross area. Previous episodes of open cast (surface) coal workings are presumed to have previously extracted the available resource beneath the Proposed Scheme. Accordingly, the effect on the proposed MSA and by association future mineral workings is considered to be minor and therefore not significant.

*Petroleum exploration and development licence (PEDL/hydrocarbons)*

10.4.30 The route of the Proposed Scheme would cross PEDL areas 299 and 303, and as such, it is considered that the study area is within an area where hydrocarbon resources including coal bed methane could be identified and extracted in the future. Construction of the Proposed Scheme is unlikely to place a constraint on future

[95] In this context, severance refers to the Proposed Scheme splitting an actual or proposed mining/mineral site into two or more areas, such that separate accesses would be required to work the whole site

exploitation of potential sources of hydrocarbon resources owing to the depth from which these resources are likely to be extracted.

10.4.31 There would be negligible effects on surface coal resources and petroleum resources, which are not significant.

10.4.32 Table 18 reports the assessment of permanent effects from construction on the mining and mineral resources identified.

Table 18: Summary of effects for mining and mineral resources

| Site name | Status | Description | Sensitivity/ value | Magnitude of impact | Effect and significance (Y/N) |
|---|---|---|---|---|---|
| PEDLs 299 and 303 | TBC | Areas where hydrocarbon resources could be identified and extracted in the future. | High | Negligible | Negligible (N) |
| Proposed mineral safeguarding for surface coal | MSA | Possible future open cast coal workings | Medium | Minor | Negligible (N) |

10.4.33 There would be negligible effects on two mining, mineral and gas resources, which are not significant.

### *Geo-conservation sites*

10.4.34 No geo-conservation areas such as SSSI or LGS are present in the study area.

## Other mitigation measures

10.4.35 At this stage, no additional measures are considered necessary to mitigate risks from land contamination during the construction stage beyond those that are set out in the draft CoCP and/or instigated as part of the site specific remediation strategies that would be developed at the detailed design stage if required. These measures would ensure that risks to people and property from contaminants in the ground would be controlled such that they would not be significant. For example, measures might include excavation and treatment of contaminated soils or controls to manage movement of landfill gas and leachate.

10.4.36 Mitigation of the effects on mineral resources could include extraction of the resource in landscaping areas within the Proposed Scheme adjacent to, rather than beneath the structural footprint of the Proposed Scheme, which would require good founding conditions. A plan would be discussed in advance of the construction works with the landowner, the mineral planning department at DCC, and any other relevant parties to assist in achieving an effective management of minerals within the Proposed Scheme.

### Summary of likely residual significant effects

10.4.37 Based on the information currently available and with the application of the mitigation measures detailed above, no likely significant residual effects are anticipated with respect to land quality.

## 10.5 Effects arising from operation

10.5.1 Users of the Proposed Scheme (i.e. rail passengers) are at all routine times within a controlled environment (i.e. within trains), and have therefore been scoped out of the assessment.

### Avoidance and mitigation measures

10.5.2 Maintenance and operation of the Proposed Scheme would be in accordance with environmental legislation and good practice. Spillage and pollution response procedures similar to those to be outlined in the draft CoCP would be established for all high risk activities and employees would be trained in responding to such incidents.

### Assessment of impacts and effects

10.5.3 The Proposed Scheme within this area would include one auto-transformer station, located at Alfreton Road. An auto-transformer station, feeder stations and sub-stations can, in principle, be a source of contamination through accidental discharge or leaks of coolant. However, in common with other modern sub-stations, secondary containment appropriate to the level of risk would be included in the installed design.

10.5.4 The operation of the trains may give rise to minor contamination through leakage of hydraulic or lubricating oils. However, such leakage or spillage is expected to be very small and unlikely to result in significant contamination.

### Other mitigation measures

10.5.5 No other mitigation measures are expected to be required beyond what has already been outlined relating to land quality in the study area.

### Summary of likely residual significant effects

10.5.6 No significant residual effects are anticipated associated with operation of the Proposed Scheme.

### Monitoring

10.5.7 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme. Requirements for monitoring would be determined as part of the investigation, treatment and validation of contamination on a site specific basis as part of the detailed design process. Monitoring requirements may include water quality, air quality and/or bulk and trace gases, depending on the site being considered.

# 11 Landscape and visual

## 11.1 Introduction

11.1.1 This section of the report presents the assessment of the likely significant landscape and visual effects identified to date within the Stonebroom to Clay Cross area. It summarises the baseline conditions found within and around the route of the Proposed Scheme and describes the likely impacts and significant effects during construction and operation on landscape and visual receptors.

11.1.2 The operational assessment section refers not just to the running of the trains, vehicles on roads and any associated lighting but also the presence of the new permanent infrastructure associated with the Proposed Scheme.

11.1.3 Engagement with Derbyshire County Council (DCC), Bolsover District Council (BDC), North East Derbyshire District Council (NEDDC) and Natural England has commenced. The purpose of this engagement has been to discuss the assessment methodology, extent of the landscape and visual study area, and the locations of visual assessment and verifiable photomontage viewpoints. Engagement will continue as part of the development of the Proposed Scheme and to inform the formal assessment.

11.1.4 The Volume 2: LA09 Map Book shows the locations of key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and operational (Map Series CT-06) features of the Proposed Scheme. It also shows the locations of landscape and visual impact mitigation measures (Map Series CT- 06) and viewpoints that would potentially be significantly affected at the construction (Map Series LV-03) and operation (Map Series LV-04) phases and Landscape Character Areas (LCA) that would potentially be significantly affected at the construction and operation phases (Map Series LV-02).

11.1.5 A separate, but related, assessment of effects on the setting of heritage assets is reported in Section 9, Historic environment.

## 11.2 Scope, assumptions and limitations

11.2.1 The scope, key assumptions and limitations for the landscape and visual assessment are set out in full in Volume 1 ,Section 8 and the Scope and Methodology Report (SMR)[96].

11.2.2 Summer surveys for the landscape and visual assessment were undertaken from July to September 2017 and winter surveys between October 2017 and March 2018 to inform the assessment. Further surveys will be undertaken to inform the assessment and will be reported in the formal ES. At this stage it has not been possible to complete surveys of all publicly accessible land in this area; therefore, for the working draft ES an assumption has been made about the level of sensitivity and magnitude of

[96] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

change on a case-by-case basis. This will be adjusted, as appropriate, on the basis of survey results to inform the formal ES.

11.2.3 The extent of the study area has been informed by construction and operational phase zones of theoretical visibility (ZTV). The ZTVs have been produced in line with the methodology described in the SMR and are an indication of the theoretical visibility of the Proposed Scheme. In some locations, extensive vegetation cover would mean the actual extent of visibility is substantially less than that shown in the ZTVs, and professional judgement will be used to further refine the study area to focus on likely significant effects.

11.2.4 Tall construction plant (for example cranes and piling rigs) is excluded from the ZTV for the construction phase, as there is a great degree of variability in the extent and timeframes of the visibility of construction activity and plant. Overhead line equipment rarely gives rise to significant effects if it is the only element visible and has, therefore, been excluded from the ZTV to give a better indication of the possible spread of significant effects to aid the assessment.

11.2.5 Landscape and visual receptors within approximately 1.5km of the route of the Proposed Scheme have been assessed as part of the study area. Long distance views of up to 1km have been considered at settlement edges, such as at Tibshelf, Stonebroom, Morton, Pilsley and Clay Cross.

11.2.6 This assessment is based on preliminary design information and makes reasonable worst case assumptions on the nature of potentially significant effects where these can be substantiated. It is based on information known at present. The assessment of landscape and visual effects during construction covers the situation in winter of year 1. The assessment of visual effects during construction covers the situation in winter of year 1. The assessment of operational visual effects covers the situation in winter and summer of year 1 and summer of year 15. The assessment of landscape effects is undertaken for the construction phase and for the operational phase at both year 1 and year 15. The landscape assessment does not consider seasonal variations e.g. winter/summer, since these do not affect character. Likely significant landscape and visual effects for year 30 will be reported in the formal ES

11.2.7 Professional judgements on landscape value are summarised in the baseline descriptions and judgements on landscape susceptibility and sensitivity are summarised as part of the assessment of effects on each significantly affected LCA. Full judgements on value, susceptibility and sensitivity will be provided in the formal ES.

11.2.8 The assessment has been carried out on the basis that design of structures would, insofar as reasonably practicable, integrate with existing skyline features and would make use of a simple, clean and coherent palette of materials to help structures fit in the landscape.

## 11.3 Environmental baseline

### Existing baseline

#### *Landscape baseline*

11.3.1 The study area extends from south of Tibshelf in the south-east to Clay Cross in the north-west and is largely centred around a section of the existing Erewash Valley Line between Morton and Clay Cross. The underlying geology consists of Pennine Middle Coal Measures with Pennine Lower Coal Measures to the west of the study area. The topography is gently undulating, with higher ground in the east falling towards the River Rother valley in the north-west. The Morton and Normanton Brooks introduce lower lying valleys to the south-east of the study area, and there is a ridge of higher ground, which runs south from Clay Cross, on the western extents of the study area. Local high points include Ryknield Street (ranging between 155 and 160m above Ordnance Datum (AOD)), Doe Hill Community Park (135m AOD), points along the Five Pits Trail (ranging between 155 and 160m AOD) and high ground to the north of Pilsley at around 180m AOD.

11.3.2 The landscape is largely characterised by farmland with areas of pasture and arable fields. However, the area has a rich mining history, which is evident in the small towns that have expanded from mining villages, and the distinctive restored spoil heaps and disused mineral railways, which cross the area. Woodland cover tends to be associated with reclaimed spoil heaps and the Erewash Valley Line corridor, but also includes areas around the Ain Moor Wood, and along Morton Brook and the River Rother. Field boundaries are more defined to the south-west of the area, where a smaller and more historic field pattern is evident. Prominent medieval strip fields are evident around North Wingfield, Pilsley, Shirland and Higham. The traditional field pattern is more degraded to the north-west, where solar farms around Padleywood Farm and Hagg Farm also contribute to the change in pattern.

11.3.3 This is a well settled landscape which includes the larger settlements of Tibshelf, Stonebroom, Morton and Pilsley. Many of the settlements in this area sit on higher ground to the east, south and south-east of the area. A dense road network links the larger settlements, villages and scattered farms and properties. Many of the settlements have developed from linear villages and have expanded significantly in recent years, with housing of different styles and materials. The settlement of Clay Cross sits on the north western edge of the study area, to the east of the A61. The Roman road of Ryknield Street runs from south to north through Clay Cross, following a prominent ridgeline to the south of this settlement, Newton and Blackwell sit on another ridgeline to the south-east of the area in the Pinxton to Newton and Huthwaite area (LA08). The ridgelines afford long views across the area, but also allow development along them to influence the surrounding rural landscape, along with the settlements on higher ground to the east of the study area. As such, the landform and settlement pattern combine to create a medium scale landscape.

11.3.4 Provision for recreation includes the Silverhill Trail promoted route (between Blackwell and Pleasley), National Cycle Network Route 67 (between Blackwell and Huthwaite, in part following the Silverhill Trail) and the Five Pits Trail (linking Grassmoor to Tibshelf). There are further public rights of way (PRoW) in the

Stonebroom to Clay Cross area, particularly to the south of Morton and linking the larger settlements around the study area. Doe Hill Community Park, a restored opencast mine, adds further recreational interest.

11.3.5 The LCAs have been determined as part of an integrated process of environmental characterisation, informed by a review of historic landscape mapping and the outcome from other topics including ecological assessments. These LCAs will be refined, as appropriate, upon review of available historic landscape characterisation data and will be included in the formal ES. Use has been made of published landscape character assessments and a wide range of supporting GIS data, aerial photography and Ordnance Survey mapping, plus desk study and fieldwork. Landscape character assessments reviewed include the relevant National Landscape Character Areas[97] and The Landscape Character of Derbyshire[98].

11.3.6 These published LCAs have been adapted for this assessment to provide LCAs of an appropriate and consistent scale. Minor amendments have also been made to some published LCA boundaries to reflect existing conditions.

11.3.7 For the purposes of this assessment, the study area for Stonebroom to Clay Cross has been subdivided into four LCAs. These LCAs are draft and subject to review in consultation with local planning authorities. Full descriptions of all LCAs will be provided in Volume 5 of the formal ES.

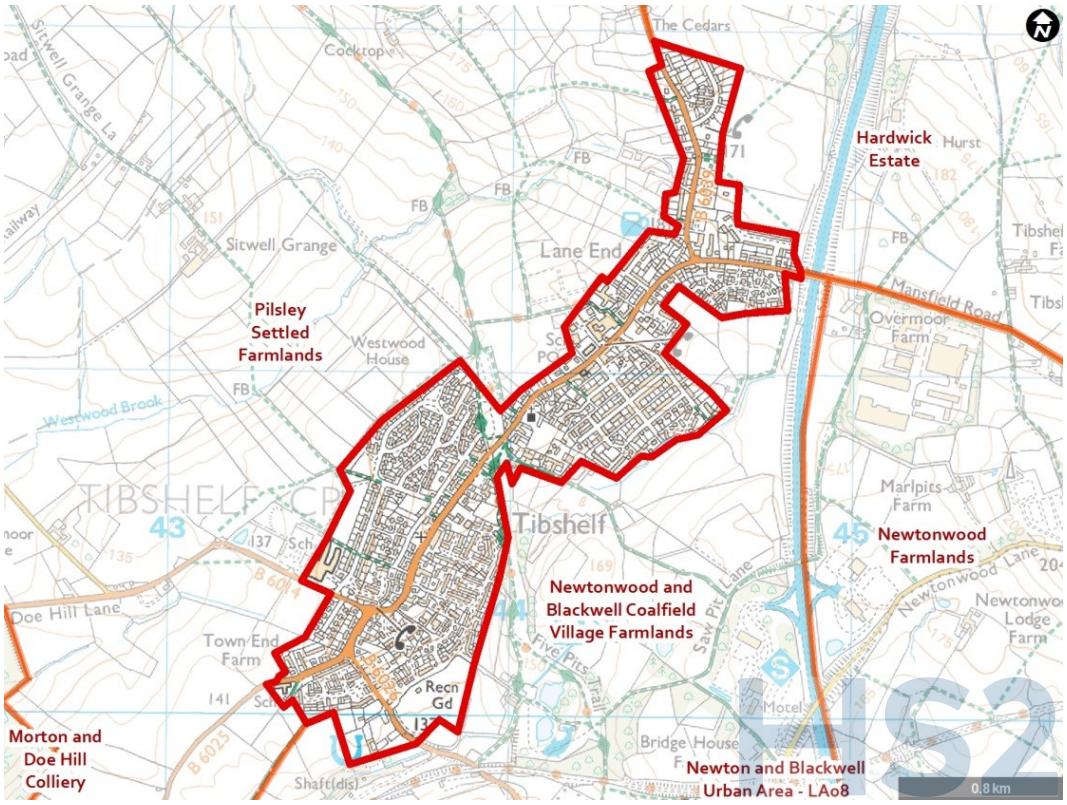
11.3.8 One of the four LCAs (Pilsley Settled Farmlands LCA) would not be significantly affected by the Proposed Scheme due to its relationship with the Proposed Scheme (which largely follows an existing railway line) and its effects on the key characteristics of the landscape. Newtonwood and Blackwell Coalfield Village Farmlands LCA is predominantly located within the Pinxton to Newton and Huthwaite area and any significant effects of the Proposed Scheme would therefore be included in Volume 2: Community area report LA08 Pinxton to Newton and Huthwaite. A summary of the remaining two LCAs that would be significantly affected within the Stonebroom to Clay Cross area is provided in Table 19.

[97] Natural England (2013, 2014), *National Character Area profiles*. Available online at: https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles

[98] The Landscape Character of Derbyshire, Fourth Edition December 2013, Derbyshire County Council, Environmental Services Department (update to First Edition December 2003)

Table 19: Summary of Significantly Affected LCAs

**Tibshelf**



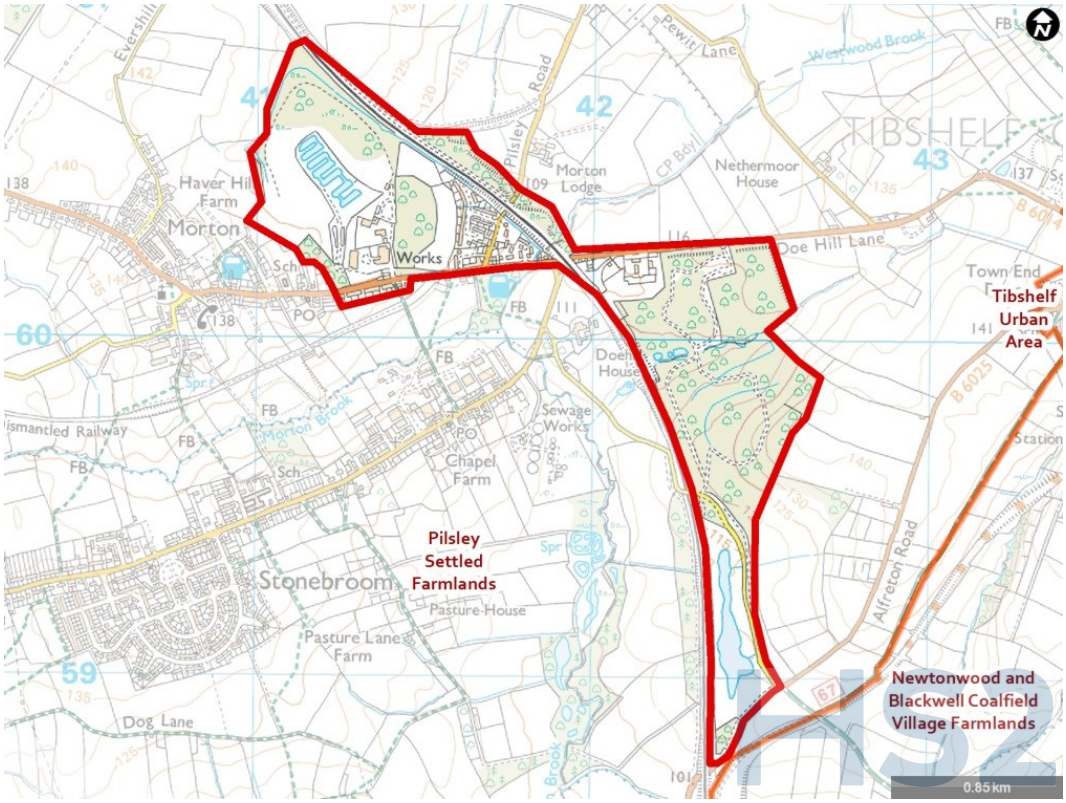

Modern urban edge from Tibshelf Ponds

Terraces along Hardwick Street

Tibshelf LCA is south-west of the M1 and north of Newton. It is focused around the linear village of Tibshelf. The settlement is sited on higher ground to the east of the study area on a ridge between Westwood Brook to the north and a tributary of Morton Brook to the south. Tibshelf is predominantly a modern village, spreading from the Victorian, mining, red brick terraces but also includes some scattered stone farm buildings which hint at an agricultural past. Land cover is characterised by residential built form, with a listed church (St John the Baptist Church) and a thatched cottage providing some local prominent landmarks. The High Street is characterised by mainly two story buildings with shops at ground level and car parking and traffic. The Five Pits Trail passes through the centre of the village. The gardens of many homes in the village contain mature trees and edges of the settlement display a quiet, suburban character with some attractive views out to surrounding countryside. Part of the village is designated as a conservation area and areas retain their industrial heritage, whilst there is a strong sense of mining history through the housing associated with it. There are parts of the village where modern settlement expansion contrasts with the distinctive character influences of the LCA and the surrounding rural landscape.

Based on the landcover, cultural, social, heritage and perceptual qualities above the value of this LCA is medium.

**Doe Hill and Morton Colliery**




Doe Hill Country Park

Restored Morton Colliery Plantation

Doe Hill and Morton Colliery LCA is located north-east of the settlements of Stonebroom and Morton, on a section of the Erewash Valley Line. Landform is characterised by large spoil heaps associated with Morton Colliery (closed 1965) and Doe Hill opencast colliery, providing distinctive evidence of former industry in the landscape. Spoil heaps have been restored and at Morton Colliery the partially wooded slopes are topped by high security fencing, visible from some distance, which surrounds rectangular filtration ponds. Doe Hill Community Park, in the south-east of the LCA, includes trails, plantation woodland, grassland and water features. Whilst reasonably well maintained, woodland has been densely planted and is currently of lower visual quality. However, there is some evidence of ecological value (for further information, refer to Section 7, Ecology and biodiversity). A small tributary of Morton Brook runs east to west through the park, with a line of mature trees (including oak) alongside. The LCA includes early 20th century brick-built, miners' cottages in Morton and industrial buildings to the west. There are some longer views to the west from Love Lane and from the high point in the Doe Hill Community Park but views are generally limited by vegetation. The existing railway and nearby busy roads do not detract from the quiet character of the area and, from the interior of the Doe Hill Community Park, there is a sense of isolation.

Based on the terrain, landcover, associations and perceptual qualities described above the value of this LCA is low-medium.

### *Visual baseline*

11.3.9 A summary description of the distribution and types of receptors most likely to be affected is provided below. The viewpoints are numbered to identify their locations and are shown on the viewpoint location maps (see Volume 2: LA09 Map Book, Map Series LV-03 and LV-04). In each case, the middle number (xxx.**xx**.xxx) identifies the type of receptor that is present in this area – 1: Protected views (none within this area), 2: Residential, 3: Recreational, 4: Transport, 5: Hotels/healthcare/education and 6: Employment.

11.3.10 Views within the Stonebroom to Clay Cross area can generally be gained from public highways, PRoW, settlements, residential properties and employment areas.

11.3.11 Whilst the larger settlements tend to be located on higher ground, views are typically restricted to properties on the settlement edges. In some limited locations with views from the interior of the settlement, the context of the view tends to be highly urban. Viewpoints considered in this assessment include elevated and longer distance views from Tibshelf and Stonebroom, and from the developed escarpment edge to the south of Clay Cross.

11.3.12 Views from PRoW can be gained from across the study area. From south to north this includes views from: the Silverhill Trail and the footpath network around Tibshelf (Tibshelf Footpath 09 and Tibshelf Bridleway 03 and 05); Stonebroom (Shirland and Higham Footpath 11); Morton (Morton Bridleway 8); and Pilsley (Pilsley Footpath 07 and 09).

11.3.13 Views can be gained from sections of road network, including close views from the B6025, the B6014 and longer distance elevated views looking east from the A61. Localised variations in topography, hedgerows, vegetation and built form play a varying role in screening views from parts of the road network.

11.3.14 In terms of views from areas of employment, the most notable areas of employment are focused around industrial estates on the edges of Clay Cross and Stonebroom. The settlements of Tibshelf and Pilsley also offer employment opportunities, including through retail, accommodation and education. Views from these developed areas tend to be foreshortened by localised built form.

## 11.4 Temporary effects arising during construction

11.4.1 As is commonplace with major infrastructure works, the scale of the construction activities means that works would be visible from many locations and would have the potential to give rise to significant temporary effects that cannot practicably be mitigated. Such effects are temporary and would vary over the construction period depending on the intensity and scale of the works at the time. The assessment of landscape and visual effects has been based on the activities occurring during the peak construction phase, which is defined as the period during which the main construction works would take place, including the presence of compounds, main earthworks and structure works.

11.4.2 The effects associated with the peak construction stage in this area are generally considered to be medium-term, based on the indicative construction programme in

Section 2.3. It is currently anticipated that the peak civil engineering stage in this area would be undertaken between the end of 2024 and middle of 2028. Effects during other stages of works are likely to be less intensive due to less construction equipment being required at the time, and a reduced intensity of construction activity.

11.4.3 Section 2.2 sets out the key permanent features of the Proposed Scheme, and Section 2.3 describes the construction compounds and associated temporary works that have been considered in this assessment.

## Avoidance and mitigation measures

11.4.4 Measures that have been incorporated into Sections 12 and 14 of the draft Code of Construction Practice (CoCP)[99] to avoid or reduce landscape and visual effects, where reasonably practicable, during construction include the following:

- avoidance of unnecessary tree and vegetation removal, and protection of existing trees in accordance with BS 5837: Trees in relation to design, demolition and construction[100];
- use of well-maintained hoardings and fencing;
- prevention of damage to the landscape features adjacent to the construction sites due to movement of construction vehicles; and
- designing lighting to avoid unnecessary intrusion onto adjacent buildings and other land uses.

11.4.5 Implementation of these measures has been taken into account in the assessment of the construction effects.

## Assessment of temporary impacts and effects

11.4.6 The most apparent changes to the landscape and to the views experienced by visual receptors during construction would relate to the presence of construction plant, compounds and soils and material storage and stockpiling. Key construction activities that would give rise to the most apparent changes to landscape and visual receptors are: the excavation of cuttings; construction of embankments; temporary structures, site haul routes and satellite construction compounds; construction activity associated with the removal of existing landscape elements, such as woodland, trees and hedgerows; and the temporary severance and diversion of existing public highways and PRoW. Other key changes include: the construction works associated with the overbridges and underbridges; the presence of transfer nodes; stockpile areas; and the demolition of buildings and structures.

### *Landscape assessment*

11.4.7 Based on the current design it is anticipated that the LCAs set out in Table 20 would be significantly affected during construction of the Proposed Scheme.

[99] Supporting document: Draft Code of Construction Practice
[100] BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations, 2012, British Standard

Table 20: Summary description and assessment of effects on LCAs

| | |
|---|---|
| **Tibshelf** | **Medium-low susceptibility and medium-low sensitivity** |
| **Susceptibility to change:** The historic core of this village and quiet, suburban character of development on the fringes (in which the surrounding countryside plays an important role in providing a rural setting) impart a medium-low susceptibility to change.<br><br>No direct landscape effects would be experienced during construction. However, the High Street through Tibshelf would be used for construction access. Construction vehicles moving along the High Street would further detract from the experiential qualities and perception of the village, especially within the context of the historic core where increased volume of traffic and larger construction vehicles would be more apparent. Properties on the north-eastern boundary would also gain close range views to construction of Tibshelf cut and cover tunnel, which lies in an adjacent LCA (in Tibshelf to Shuttlewood (LA10)) to the east. Construction works would include the removal of mature vegetation along the M1 and views towards Hardstoft South Cutting satellite compound and stockpiles, also located within Tibshelf to Shuttlewood (LA10), to the east of this study area. This would alter the perception of the surrounding rural setting of the village.<br><br>Therefore, these changes would result in medium magnitude of change and a moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |
| **Doe Hill and Morton Colliery** | Low susceptibility and medium-low sensitivity |
| **Susceptibility to change:** The engineered landform, land cover and post-industrial landscape character have a low susceptibility to change arising from the construction of the Proposed Scheme.<br><br>The LCA would be directly affected by the clearance of existing vegetation and the construction of earthworks within Doe Hill Community Park, and along a section of the Erewash Valley Line. This would change the quiet character of the LCA and open up views to existing rail infrastructure, while also introducing large scale construction vehicle movements, activity and noise. The associated vegetation removal and haul route to the east of the Proposed Scheme would further affect the perception of the restored park landscape. Large scale earthworks associated with the construction of a Stonebroom cutting and Stonebroom embankment would result in severance of Doe Hill Community Park and changes to the terrain. Large stockpiles within Doe Hill Park and immediately adjacent to the south would change the character and visual connection to the surrounding rural landscape setting. Construction activity associated with Stonebroom embankment and Doe Hill culvert would also require the removal of mature trees along a watercourse that runs through the centre of the park.<br><br>Construction works would affect the majority of this LCA therefore resulting in a high magnitude of change and a moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |

## *Visual assessment*

### Introduction

11.4.8 The following section describes the likely significant effects on visual receptors during construction. The construction assessment has been undertaken for the winter period, in line with best practice guidance, to ensure a robust assessment. However, in some cases, visibility of construction activities may be reduced during summer when vegetation, if present in a view, would be in leaf.

11.4.9 Where a viewpoint represents multiple types of receptor, the assessment is based on the most sensitive receptors. Effects on other receptor types with lower sensitivity would be lower than those reported.

11.4.10 Night-time surveys will be undertaken to inform the assessment in the formal ES. Potential visual impacts arising from additional lighting at night during construction within the area may arise from continuous working and/or overnight working. Assessment of these effects will be reported in the formal ES on completion of the night time assessment.

11.4.11 Table 21 describes the construction phase potentially significant visual effects based on the current design of the Proposed Scheme. Viewpoint locations are shown in Map Series LV-03 in the Volume 2: LA09 Map Book.

Table 21: Construction phase potentially significant visual effects

| | |
|---|---|
| **Views west and east from PRoW (Tibshelf Bridleway 5) near Alfreton Road, Tibshelf (VP 440-03-006 and 440-03-007) (Map Number LV-03-440b)** | **Medium-high sensitivity receptors** |
| Users of recreational footpaths heading south from Tibshelf would experience substantial changes in close distance views as a result of construction works associated with the Blackwell North embankment, to the south, and Stonebroom cutting, to the west. The site haul route along the northern side of the route of the Proposed Scheme and temporary materials stockpiles, including a stockpile immediately south of the view, and construction of an accommodation access along the Silverhill Trail would also appear crossing the majority of the views. Path side hedgerows and vegetation would offer some filtering of views, more so in summer. The presence of equipment and movement of construction vehicles would be readily visible. . Similar views (but with Blackwell North embankment seen in views to the east and Stonebroom cutting in views to the north) of large scale earthworks and construction activity would also be available when approaching the Proposed Scheme from the south, along Tibshelf Bridleway 5. Construction works would alter the rolling terrain and farmed land cover and vegetation pattern (disturbed ground in place of woodland belts and hedgerows) in the view. There would therefore be a high magnitude of visual change and major adverse effect. | **Level of effect:** Major adverse (significant) |
| **Views for residents (and road users) in Tibshelf (VP 440-02-005 and 440-04-004) (Map Number LV-03-440b)** | **High to medium sensitivity receptors** |
| Residents (and road users) on the Alfreton Road on the southern edge of the settlement would experience substantial changes in middle distance elevated views as a result of construction works associated with Stonebroom cutting and Stonebroom embankment and construction activity including vegetation clearance in Doe Hill Community Park. Similar, albeit more framed views would be available from Alfreton Road, further north within Tibshelf (VP 440-02-005). Construction traffic on Alfreton Road would also result in noticeable, transient changes in near distance views. There would therefore be a high (on the settlement edge) to medium magnitude of visual change and moderate adverse effect. | **Level of effect:** Moderate adverse (significant) |

| | |
|---|---|
| **View south for users of recreational footpaths in Doe Hill Community Park (VP 441-03-003) (Map Number LV-03-441)** | **Medium-high sensitivity receptors** |
| Users of recreational footpaths in Doe Hill Community Park would experience substantial changes in near distance views as a result of construction works associated with the Stonebroom cutting (to the south of view) and Stonebroom embankment (to the west of view). Construction works would include the clearance of semi-mature woodland within the park, mature woodland along the watercourse and the loss of associated ponds at the centre of the Doe Hill Community Park. Views of the site haul route along the northern side of the Proposed Scheme and temporary materials stockpiles, including stockpiles to the immediate east of the park, would also appear crossing the majority of the views from more elevated areas within the park. Construction works would alter the terrain, the restored industrial vegetation pattern (disturbed ground replacing grassland and densely planted semi-mature woodlands) and still nature of the park, in the view. The construction works, presence of equipment and movement of construction vehicles would therefore result in a high magnitude of visual change and major adverse effect. | **Level of effect:** Major adverse (significant) |
| **View north-east for residents at Doe Hill House Farm (VP 441-02-002) (Map Number LV-03-441)** | **High sensitivity receptors** |
| This view is representative of the view from Doe Hill House Farm and the PRoW to the south (Tibshelf BW 3) which would experience notable changes in near distance views as a result of construction works associated with Stonebroom embankment. This would include the clearance of mature woodland along the Erewash Valley Line and views of taller construction plant within Doe Hill Community Park, to the north-east of the existing railway. Mature vegetation and large outbuildings around the property are likely to provide a level of screening. However, views of construction works associated with the Proposed Scheme are likely from parts of the property curtilage and the approach to the property (Love Lane) and during the winter months when screening is less effective. There would therefore be a medium magnitude of visual change and moderate adverse effect. | **Level of effect:** Moderate adverse (significant) |
| **Views east for users of recreational footpaths (Shirland and Higham Footpath 11) to the east of Stonebroom (VP 441-03-001) (Map Number LV-03-441)** | **Medium-high sensitivity receptors** |
| Users of recreational footpaths to the east of Stonebroom would experience notable changes in middle distance elevated views as a result of construction works associated with Stonebroom cutting and Stonebroom embankment and construction activity including vegetation clearance in Doe Hill Community Park. This would include the clearance of vegetation along the Erewash Valley Line and views of taller construction plant within Doe Hill Community Park, to the east of the existing railway. This would alter the rural setting and vegetation pattern across a wide part of the view to the east. There would therefore be a medium magnitude of visual change and moderate adverse effect. | **Level of effect:** Moderate adverse (significant) |
| **Views south-west from residents at Sitwell Grange Farm (VP 441-02-007) (Map Number LV-03-441)** | **High sensitivity receptors** |
| Residents at Sitwell Grange Farm would experience notable changes in middle distance elevated views as a result of construction works associated with Stonebroom cutting, Stonebroom embankment, Morton cutting and construction activity including vegetation clearance in Doe Hill Community Park. This would include the clearance of mature woodland along the Erewash Valley Line. The presence of construction equipment and vehicle movements, including on the site haul route on the eastern side of the Proposed Scheme, along with satellite compounds and temporary materials stockpiles would add further construction activity into the view. This would likely affect a wide angle of view to the south-west and alter the rural setting and vegetation pattern in these views. There would therefore be a medium magnitude of visual change and moderate adverse effect. | **Level of effect:** Moderate adverse (significant) |

| | |
|---|---|
| **View south from residents at Morton Lodge on Pilsley Road (VP 441-02-005) (Map Number LV-03-441)** | **High sensitivity receptors** |
| Residents (and road users travelling south) on Pilsley Road would experience substantial changes in close views as a result of construction works associated with Stonebroom embankment and Stonebroom embankment satellite compound. Scrub and semi-mature woodland clearance within Morton Railway Local Wildlife Site (LWS) would open up immediate views towards the existing Erewash Valley Line with construction works associated with Stonebroom embankment immediately in front. The site haul route on the northern side of the route of the Proposed Scheme and the presence of construction equipment and vehicle movements would be the key elements in views. This would alter the terrain, vegetation pattern (disturbed ground replacing farmland, hedgerows and areas of scrub) and surrounding rural context in the view. Construction works associated with Pilsley Road underbridge and associated mature vegetation removal would introduce further activity into the view, seen in framed views south looking down Pilsley Road. There would therefore be a high magnitude of visual change and major adverse effect. | **Level of effect:** Major adverse (significant) |
| **View south-west from residents and recreational users of footpaths near Padleywood Farm and north-east from footpaths near Averill Farm (Morton Bridleway 8) (VPs 441-03-008 and 441-03-006) (Map Number LV-03-441)** | **High to medium-high sensitivity receptors** |
| Residents and users of the PRoW network near Padleywood Farm and Averill Farm (both representative of residential views) would experience notable changes in near distance views as a result of construction works associated with Morton cutting. This would include the clearance of mature woodland along the Erewash Valley Line; a site haul route on the northern side and smaller temporary materials stockpiles seen either side of the Proposed Scheme. The presence of construction equipment and vehicle movements would also be apparent. This would alter the vegetation pattern (mainly associated with woodland removal) and rural context of the view. There would therefore be a medium magnitude of visual change and moderate adverse effect. | **Level of effect:** Moderate adverse (significant) |
| **View south-west for recreational users of footpaths near Bushypark Farm (Pilsley Footpath 2) (VP 442-03-003) (Map Number LV-03-442)** | **High to medium-high sensitivity receptors** |
| Users of the PRoW network near Bushypark Farm would experience notable changes in middle distance elevated views as a result of construction works associated with Morton cutting. This would include the clearance of mature woodland along the Erewash Valley Line and a site haul route and temporary materials stockpiles on the eastern side of the Proposed Scheme. The presence of construction equipment and vehicle movements would also be apparent. This would alter the vegetation pattern (mainly associated with woodland removal) and rural context across a wide part of this open view. There would therefore be a medium magnitude of visual change and moderate adverse effect. | **Level of effect:** Moderate adverse (significant) |

## Other mitigation measures

11.4.12 To further reduce the significant effects described above, consideration will be given during the detailed design stage to where planting can be established early in the construction programme to help achieve earlier landscape and visual integration. However, not all landscape and visual effects can be mitigated due to the visibility of construction activity and the sensitivity of surrounding receptors. No other mitigation measures are considered practicable during construction.

## Summary of likely residual significant effects

11.4.13 The temporary residual significant effects during construction remain as described above. These effects would be temporary and reversible in nature lasting only for the duration of the construction works. These residual effects would generally arise from

the widespread presence of construction activity and construction plant within the landscape and viewed by surrounding residents, and users of PRoW and main roads within the study area.

11.4.14 The significant effects that would remain after implementation of construction phase mitigation are summarised below:

- moderate adverse landscape effects in relation to two LCAs;
- major adverse visual effects from one residential viewpoint location;
- major adverse visual effects from three recreational viewpoint locations;
- moderate adverse visual effects from three residential viewpoint locations;
- moderate adverse visual effects from four recreational viewpoint locations; and
- moderate adverse visual effects from one transport viewpoint location.

## 11.5 Permanent effects arising from operation

11.5.1 The permanent features of the Proposed Scheme that have been taken into account in determining the effects arising during operation on landscape and visual receptors are presented in Section 2.2 of this report.

### Avoidance and mitigation measures

11.5.2 The operational assessment of impacts and effects is based on year 1 (2033) and year 15 (2048) of the Proposed Scheme, with Year 30 (2063) to be reported in the formal ES. A process of iterative design and assessment has been employed, and is ongoing, to avoid or reduce adverse effects during the operation of the Proposed Scheme. Measures that would be integrated into the design of the Proposed Scheme include:

- design of earthworks to tie the engineering earthworks for embankments (such as Blackwell North embankment, Blackwell South embankment and Stonebroom embankment) and cuttings into their wider landscape context and to mitigate views of structures and overhead line equipment from sensitive receptors, where reasonably practicable;
- compensatory woodland planting in areas of loss, using locally appropriate species composition and planting types (and appropriate planting density), such as woodland planting to compensate for the partial loss of woodland planting associated with Silverhill Trail, Morton Brook tributary, Doe Hill Community Park, Padley Wood and woodland associated with the Erewash Valley Line, and to provide habitat connectivity, enhanced landscape/green infrastructure connectivity, as well connectivity of historic landscape features, where reasonably practicable, and to soften embankments and viaduct abutments; and
- hedgerow replacement and restoration in areas of loss to restore connectivity and landscape pattern, where reasonably practicable, and using an appropriate palette of hedgerow types and species to tie the Proposed Scheme mitigation

into the wider landscape character.

## Assessment of impacts and effects

11.5.3 The likely effects on landscape and visual receptors during operation of the Proposed Scheme relate to the presence of new structures and elements in the landscape including underbridges, overbridges and the presence of large scale earthworks. Other aspects include the presence of overhead line equipment and the movement of trains.

### *Landscape assessment*

11.5.4 Based on the current design, it is currently anticipated that the LCA described in Table 22 would be significantly affected during operation of the Proposed Scheme.

Table 22: Operation phase significant landscape effects

| **Doe Hill and Morton Colliery** | **Low susceptibility and low-medium sensitivity** |
|---|---|
| Susceptibility to change: The engineered landform, land cover and post-industrial landscape character have a low susceptibility to change arising from the Proposed Scheme.<br><br>Year 1: Doe Hill and Morton Colliery LCA would be directly affected, mainly through loss of vegetation, changes to landform, severance of the landscape and changes to the restored industrial character. The Proposed Scheme would run through the middle of the Doe Hill Community Park and along the eastern edge of Morton Colliery. Loss of vegetation would result along the existing Erewash Valley Line. Within Doe Hill Community Park, introduction of a large cutting and embankments would alter the landform, increase perception of landscape severance and require further vegetation loss. Landscape severance would be slightly offset by the introduction of a footbridge. The Proposed Scheme would also run on a higher alignment than the existing railway and increase the presence of trains and movement in the landscape. Increased movement (and noise) associated with the operational trains would alter the quiet, restored industrial character.<br><br>These effects would be apparent across the majority of this LCA, therefore resulting in a high magnitude of change and moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |
| Year 15: Due to the maturing vegetation, which would help to restore the landscape character, effects would therefore reduce to non-significant by year 15. | **Level of effect:**<br><br>Non-significant |

### *Visual assessment*

#### Introduction

11.5.5 The following section describes the likely significant effects on visual receptors during operation year 1 and year 15. Effects at operation year 30 will be reported in the formal ES. The assessment has been undertaken for the winter period, in line with best practice guidance, to ensure a robust assessment. However, in some cases, visibility of the operational Proposed Scheme may be reduced during summer when vegetation, if present in a view, would be in leaf.

11.5.6 Where a viewpoint represents multiple types of receptor, the assessment is based on the most sensitive receptors. Effects on other receptor types with a lower sensitivity would be lower than those reported.

11.5.7 Table 23 identifies the locations where the operation of the Proposed Scheme would potentially result in significant effects. Viewpoint locations are shown in Map Series LV-04 in the Volume 2: LA09 Map Book.

Table 23: Operation phase significant visual effects

| | |
|---|---|
| **Views west and east from PRoW (Tibshelf Bridleway 5) near Alfreton Road, Tibshelf (Medium-high sensitivity receptor) (VP 440-03-006 and 440-03-007) (Map Number LV-04-440b)** | |
| **Year 1 – winter and summer:**<br><br>At year 1, users of PRoW near Tibshelf (Tibshelf Bridleway 5) would experience substantial changes in near distance views as a result of the Proposed Scheme. In views to the south, Blackwell north embankment and in views to the west, Stonebroom cutting would occupy much of the existing view. Similar views would also be available when approaching the Proposed Scheme from the south, from Tibshelf Bridleway 5 (VP 440-03-007). These features would alter the undulating landform, introducing engineered landforms, and result in the loss of vegetation, including a mature tree belt along the disused railway line which would change the well vegetated character of the view. Overhead line equipment and the movement of trains would also be apparent. Mitigation planting would not contribute to any visual integration or screening at this stage.<br><br>The magnitude of change would therefore be high for footpath users and there would be a moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |
| **Year 15 – summer:**<br><br>Due to the maturing vegetation present in the view, effects would reduce to non-significant by year 15. | **Level of effect:**<br><br>Non-significant |
| **View south for users of recreational footpaths in Doe Hill Community Park (Medium-high sensitivity receptor) (VP 441-03-003) (Map Number LV-04-441)** | |
| **Year 1 – winter and summer:**<br><br>In year 1, users of recreational footpaths in the Doe Hill Community Park would experience large scale changes in near distance views looking west towards Stonebroom embankment. Woodland removal in the Doe Hill Community Park and along the Erewash Valley Line would be apparent. New train movements (in addition to those along existing railway) and views of the existing Erewash Valley Line opened up by woodland removal would also be apparent. In addition, mature woodland along the watercourse and associated ponds, to the north of view and within the centre of the Doe Hill Community Park, would have been removed and replaced by the Doe Hill culvert. Mitigation planting would not provide any screening or landscape integration at this stage.<br><br>The magnitude of change would therefore be high for footpath users and there would be a major adverse effect. | **Level of effect:**<br><br>Major adverse (significant) |
| **Year 15 – summer:**<br><br>Due to the maturing vegetation present in the view, effects would reduce to non-significant by year 15. | **Level of effect:**<br><br>Non-significant |
| **Views east for users of recreational footpaths (Shirland and Higham Footpath 11) to the east of Stonebroom (VP 441-03-001) (Map Number LV-04-441)** | |

| | |
|---|---|
| Users of recreational footpaths to the east of Stonebroom would experience notable changes in middle distance elevated views as a result of the Proposed Scheme. Due to the viewing angle and elevated nature of the view Stonebroom cutting, seen in views to the east, would form the main change in the view. This feature would alter the vegetation pattern and terrain in Doe Hill Community Park, which contributes to the rural setting of the view. Overhead line equipment and the movement of trains would also be apparent. Mitigation planting would not provide any screening or landscape integration at this stage.<br><br>The magnitude of change would therefore be medium for footpath users and there would be a moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |
| **Year 15 – summer:**<br><br>Due to the maturing vegetation present in the view, effects would reduce to non-significant by year 15. | **Level of effect:**<br><br>Non-significant |

**View south from residences at Morton Lodge (High sensitivity receptors)(VP 441-02-005) (Map Number LV-04-441)**

| | |
|---|---|
| **Year 1 – winter and summer:**<br><br>At year 1, residents along Pilsley Road would experience substantial changes in near distance views as a result of the Proposed Scheme. The loss of scrub and semi-mature woodland, in the triangular area to the west of the road (including Morton Railway LWS), would open up views towards the Stonebroom embankment. Stonebroom embankment would foreshorten views towards the wooded profile of Morton and Doe Hill Colliery to the south. Overhead line equipment and the movement of trains would be apparent. The Pilsley Road underbridge would introduce a further structure into the view altering the surrounding rural context. Mitigation planting would not provide any screening or landscape integration at this stage.<br><br>The magnitude of change would therefore be high for residents and there would be a major adverse effect for highest sensitivity receptors. | **Level of effect:**<br><br>Major adverse (significant) |
| **Year 15 – summer:**<br><br>Due to the maturing vegetation present in the view, effects would reduce to non-significant by year 15. | **Level of effect:**<br><br>Non-significant |

**View south-west from residences and recreational users of bridleway near Padleywood Farm and north-east from bridleway near Averill Farm (Morton Bridleway 8) (High to Medium-high sensitivity receptors) (VP441-03-008 and 441-03-006) (Map Number LV-04-441)**

| | |
|---|---|
| **Year 1 – winter and summer:**<br><br>In year 1, residents and users of the PRoW network (Morton Bridleway 8) near Padleywood Farm and Averill Farm would experience notable changes in near distance views as a result of the Proposed Scheme. The removal of mature lineside vegetation, along the Erewash Valley Line, would open up views to the movement of trains and alter the vegetation pattern in the view. The Proposed Scheme would run on a slightly lower elevation along the Morton cutting crossing a large part of the existing open view. Mitigation planting would not provide any screening or landscape integration at this stage.<br><br>The magnitude of change would therefore be medium for residents and footpath users and there would be moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |
| **Year 15 – summer:**<br><br>Due to the maturing vegetation present in the view, effects would reduce to non-significant by year 15. | **Level of effect:**<br><br>Non-significant |

## Other mitigation measures

11.5.8 The permanent effects of the Proposed Scheme on landscape and visual receptors would be reduced through integration of the measures described in this section. Effects in Year 1 may also be further reduced through establishing planting early or in advance of the main construction programme. Other features such as additional earthworks, planting or greenspace would be considered as part of the ongoing development of the design. These measures would potentially provide additional screening and/or greater integration of the Proposed Scheme into the landscape.

## Summary of likely residual significant effects

11.5.9 In many cases, significant effects would reduce over time as the proposed mitigation planting matures and reaches its designed intention. However, no adverse significant landscape or visual effects would remain following year 15 of operation

## Monitoring

11.5.10 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme.

11.5.11 There are no area-specific requirements for monitoring landscape and visual mitigation during the operation of the Proposed Scheme in the Stonebroom to Clay Cross area.

# 12 Socio-economics

## 12.1 Introduction

12.1.1 This section reports on the environmental baseline, likely economic and employment impacts and significant effects identified to date during construction and operation of the Proposed Scheme within the Stonebroom to Clay Cross area. The assessment considers existing businesses, community organisations, local employment and local economies, including planned growth and development.

12.1.2 Engagement with Bolsover District Council (BDC) and North East Derbyshire District Council (NEDDC) has been undertaken as part of the development of the Proposed Scheme. The purpose of the engagement was to increase the understanding of socio-economic characteristics identified through a review of publicly available data. Engagement will continue as part of the development of the Proposed Scheme and to inform the formal assessment.

12.1.3 The socio-economic effects on employment at a route-wide level are reported in Volume 3: Route-wide effects.

12.1.4 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2: LA09 Map Book.

## 12.2 Scope, assumptions and limitations

12.2.1 The scope, assumptions and limitations for the socio-economics assessment are set out in Volume 1, Section 8 and the SMR[101].

12.2.2 The assessment of in-combination effects will draw upon the findings of other technical disciplines (e.g. air quality, sound, noise and vibration, landscape and visual and traffic and transport). Likely significant in-combination effects on socio-economic receptors and resources will be reported in the formal ES. Businesses may experience significant isolation effects as a result of the Proposed Scheme. Likely significant isolation effects will be reported in the formal ES.

## 12.3 Environmental baseline

### Existing baseline

#### *Study area description*

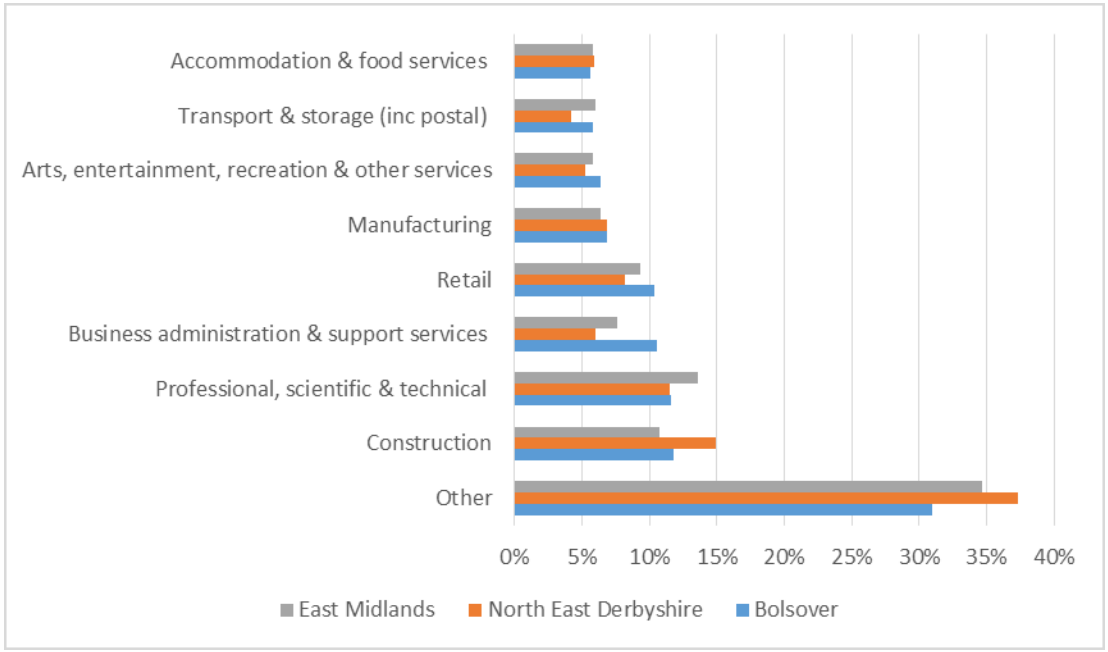
12.3.1 The following provides a brief overview of employment, economic structure, labour market and business premises availability within the Stonebroom to Clay Cross area. It lies within the administrative areas of BDC and NEDDC. It also wholly falls within both the Sheffield City Region Local Enterprise Partnership (LEP) area[102] and D2N2 Local Enterprise Partnership (LEP) areas and East Midlands region.

[101] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report
[102] Sheffield City Region, Who We Are. Available online at: https://sheffieldcityregion.org.uk/about-us-governance-policy/who-we-are

### *Business and labour market*

12.3.2 Within the Stonebroom to Clay Cross area there is a wide spread of business types reflecting a diverse range of commercial activities. Within the BDC area, where most socio-economic impacts would arise, construction accounts for the largest proportion of businesses (12%) alongside professional, scientific and technical (12%) sectors, with business administration and support services (11%). In NEDDC, the construction sector accounts for the largest proportion of businesses (15%) with professional, scientific and technical (12%), and agriculture, forestry & fishing (9%) sectors also accounting for relatively large proportions. This is shown in Figure 9. For comparison, within the East Midlands region[103], professional, scientific and technical sector (14%) accounts for the largest number of businesses with construction (11%) and also retail (9%) accounting for relatively large numbers of businesses.

Figure 9 Business sector composition in the BDC and NEDDC areas and the East Midlands region[104]

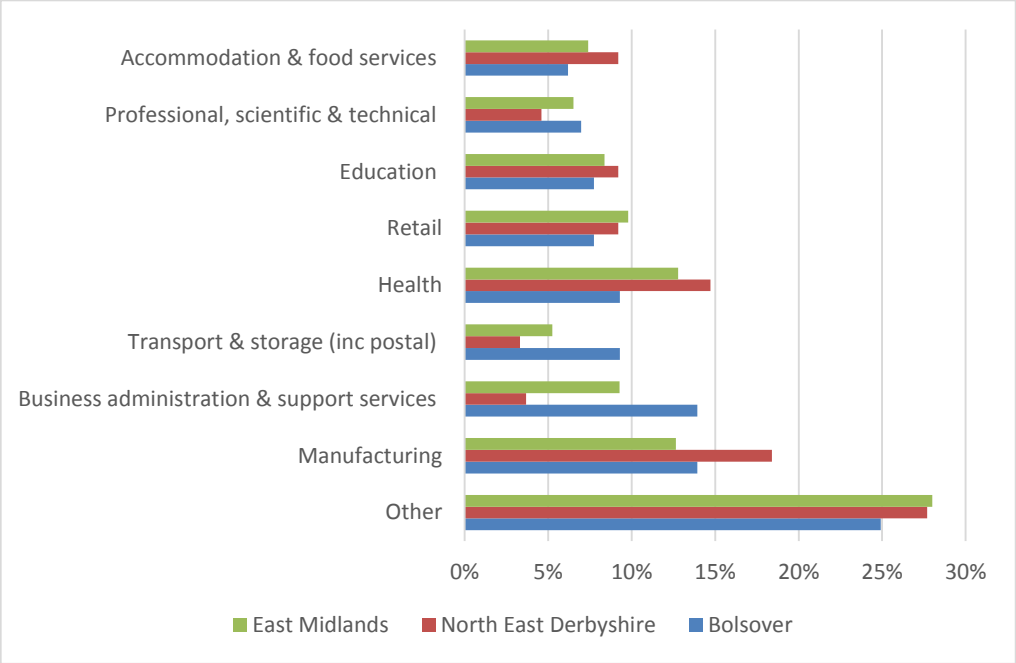



12.3.3 In 2016[105], approximately 33,000 people worked in the BDC area and 28,000 people worked in NEDDC. According to the Office for National Statistics Business Register and Employment Survey 2016, the top five sectors in terms of share of employment in BDC were: manufacturing (14%); business administration and support services (14%); transport and storage (including postal) (9%); health (9%); and retail (8%). In NEDDC, the top five sectors were: manufacturing (18%); health (15%); construction (9%); retail (9%); and accommodation and food services (9%). These compare with the top five sectors for the East Midlands region, which were: health (13%); manufacturing (13%);

[103] Office for National Statistics; UK Business count –Local Units 2017; https://www.nomisweb.co.uk
[104] "Other" includes: Health; Motor trades; Property; Agriculture, forestry & fishing; Wholesale; Education; Information & communication; Financial & insurance; Public administration & defence; and Mining, quarrying & utilities
[105] Office for National Statistics; 2016; Business Register and Employment Survey; http://www.nomisweb.co.uk - This number includes both residents and non-residents of BDC and NEDDC who work within their boundaries.

retail (10%); business administration and support services (9%); and education (8%). This is shown in Figure 10[106].

Figure 10 Employment by industrial sector in the Bolsover District Council and North East Derbyshire Council areas and the East Midlands region[107]




12.3.4 According to the Annual Population Survey (2016)[108], the employment rate[109] within the BDC area was 75% (36,600 people), and 77% in the NEDDC area (45,100 people), which is either at parity or in excess of the rates recorded for the East Midlands (75%) and England (74%) respectively. In 2016, unemployment[110] in the BDC and NEDDC areas was 4%, and which was either at parity or inferior to the East Midlands region (4%) and England (5%).

12.3.5 According to the Annual Population Survey (2016)[111], 22% of BDC residents aged 16-64 were qualified to National Vocational Qualification Level 4 (NVQ4) and above, compared to 31% in the East Midlands region and 38% in England, while 8% of residents had no qualifications, which was the same as both for the East Midlands region and England. In the NEDDC area, 32% of residents aged 16-64 were qualified to NVQ4 and above, with 5% of its residents having no qualifications.

[106] Office for National Statistics; 2015; Business Register and Employment Survey; Available online at http://www.nomisweb.co.uk - this number includes both residents and non-residents of BDC and NEDDC who work within their boundaries.
[107] "Other" includes: Construction; Wholesale; Arts, entertainment, recreation & other services; Public administration & defence; Information & communication; Motor trades; Mining, quarrying & utilities; Property; Financial & insurance; and Agriculture, forestry & fishing
[108] Annual Population Survey, (2016), NOMIS; Available online at: http://www.nomisweb.co.uk
[109] The proportion of working age (16-64 year olds) residents that is in employment
[110] Refers to people without a job who were available to start work in the two weeks following their interview and who had either looked for work in the four weeks prior to interview or were waiting to start a job they had already obtained. As the unemployed form a small percentage of the population, the APS unemployed estimates within local authorities are based on very small samples so for many areas would be unreliable. To overcome this ONS has developed a statistical model that provides better estimates of total unemployed for unitary authorities and local authority districts (unemployment estimates for counties are direct survey estimates), NOMIS.
[111] Annual Population Survey, (2016), NOMIS; Available online at: http://www.nomisweb.co.uk

### *Property*

12.3.6 A review of employment land in 2018 identified a supply of 68ha of employment land in the BDC[112] area compared to an employment land target of 80 to 100ha to meet local needs up to 2033. According to the latest update of the BDC employment land review, this is considered sufficient to enable the Council to meet their employment targets. A review in 2017 identified an available supply of 91ha[113] against a need for 28-41ha[114] identified in the NEDDC area.

12.3.7 The average vacancy rate for industrial and warehousing property in the BDC and NEDDC areas has been assessed as 4% and 6% respectively based on marketed space against known stock[115].

## 12.4 Effects arising during construction

### Avoidance and mitigation measures

12.4.1 The draft Code of Construction Practice (CoCP)[116] includes a range of provisions[117] that would help mitigate socio-economic effects associated with construction within this area, including:

- reducing nuisance through sensitive layout of construction sites (Section 5);
- consulting businesses located close to hoardings on the design, materials used and construction of the hoarding, to reduce impacts on access to and visibility of their premises (Section 12);
- applying best practicable means (BPM) during construction works to reduce noise (including vibration) at sensitive receptors (including local businesses) (Section 13);
- monitor and manage flood risk and other extreme weather events that may affect socio-economic resources during construction (Section 13);
- site specific traffic management measures including requirements relating to the movement of traffic from business and commercial operators of road vehicles, including goods vehicles (Section 14); and
- maintaining access to businesses for the duration of construction works where reasonably practicable (Section 14).

[112] Bolsover District Council (2018) Employment and Land Availability Assessment http://www.bolsover.gov.uk/images/LIVE/P/Plan_EB_EmpLAAreport_1803.pdf
[113] North East Derbyshire District Council (2017), Employment Sites Study
[114] North East Derbyshire District Council (2017), Employment Land Review Update
[115] Vacant space is based on marketed space identified from Estates Gazette data (EGi); stock data is taken from information supplied by the Valuation Office (VOA)
[116] Supporting document: Draft Code of Construction Practice
[117] All construction will be undertaken in accordance with the Code of Construction Practice. The CoCP will also contain generic control measures and standards to be implemented throughout the full duration of the construction phase

## Assessment of impacts and effects

12.4.2 The proposed construction works are assessed for socio-economic effects in relation to:

- premises demolished with their occupants and employees needing to relocate to allow for construction of the Proposed Scheme;
- in-combination effects (e.g. air quality, noise, vibration, construction traffic and visual impacts) and isolation of an area, which could affect business operations, both will be reported in the formal ES. Any resulting effects on employment will be reported at a route-wide level (see Volume 3: Route-wide effects); and
- potential employment opportunities arising from construction in the local area (including in adjacent community areas).

### *Temporary effects*

#### In-combination effects

12.4.3 Businesses within the Stonebroom to Clay Cross area may experience air quality, noise and vibration or construction traffic impacts as a result of construction of the Proposed Scheme. Taken in combination, the residual effects from these other topic assessments may amount to a significant change in the environment. In-combination effects will be reported in the formal ES.

#### Isolation

12.4.4 Businesses may experience significant isolation effects on non-agricultural businesses as a result of the Proposed Scheme in the Stonebroom to Clay Cross area. Isolation effects will be reported in the formal ES.

#### Construction employment

12.4.5 It is currently expected that there would be four satellite compounds in the Stonebroom to Clay Cross area at Stonebroom Embankment, Alfreton Road, New Station Road and Morton Cutting Pond. These sites could result in the creation of up to 680 person years of construction employment opportunities[118], broadly equivalent to 70 full-time jobs[119], which, depending on skill levels required and the skills of local people, are potentially accessible to residents in the locality and to others living further afield. The impact of the direct construction employment creation has been considered as part of the route-wide assessment (see Volume 3: Route-wide effects).

12.4.6 Direct construction employment could also lead to opportunities for local businesses to supply the project or to benefit from expenditure of construction workers. The impact of the indirect construction employment creation has been considered as part of the route-wide assessment (see Volume 3: Route-wide effects).

[118] Construction labour is reported in construction person years, where one construction person year represents the work done by one person in a year composed of a standard number of working days
[119] Based on the convention that 10 employment years is equivalent to one full time equivalent job

12.4.7 The resulting effects on employment are reported in aggregate at a route-wide level (see Volume 3: Route-wide effects).

### *Permanent effects*

#### Businesses

12.4.8 Businesses directly affected, comprising those that lie within land required for the Proposed Scheme, are reported in groups, where possible, to form defined resources based on their location and operational characteristics. A group could contain either one or a number of businesses reflecting the fact that a building may have more than one occupier or that similar businesses and resources are clustered together.

12.4.9 It is currently expected that two business units in the Stonebroom to Clay Cross area would experience significant permanent direct effects as a result of the construction of the Proposed Scheme.

12.4.10 It is currently expected that no businesses in the area would experience significant permanent direct effects as a result of land required by the Proposed Scheme. Across all of the employment sectors reviewed in the area, it is currently expected that an estimated 15 jobs[120] would either be displaced, or possibly lost within the Stonebroom to Clay Cross area. There is a reasonable probability that businesses would be able to relocate to places that would still be accessible to local residents within the travel to work areas, due to the general availability of vacant premises. However, there may be cases where alternative locations are problematic and the businesses may be unable to relocate on a like-for-like basis within the area. The impact on the local economy from the relocation or loss of jobs is considered to be relatively modest in the context of the total number of people employed in the Stonebroom to Clay Cross area (approximately 33,000 in the BDC area and 28,000 in the NEDDC area).

12.4.11 The resulting effects on employment are reported in aggregate at a route-wide level (see Volume 3: Route-wide effects)

## Other mitigation measures

12.4.12 Businesses displaced by the Proposed Scheme would be compensated in accordance with the Compensation Code. HS2 Ltd recognises the importance of businesses, displaced from their existing premises, being able to relocate to suitable alternative premises and at this stage it assumes that it would, therefore, adopt a policy to offer additional support over and above statutory requirements to facilitate this process as it has done on Phases One and 2a.

12.4.13 The construction of the Proposed Scheme offers considerable opportunities to businesses and residents along the route of the Proposed Scheme in terms of supplying goods and services and obtaining employment. HS2 Ltd at this stage assumes that it would, therefore, adopt a policy to work with its suppliers to build a

[120] Employment within businesses has been estimated through a combination of sources, for example, surveys of businesses, the Experian employment dataset, employment floor space and the Homes and Communities Agency (HCA) Employment Densities Guide 3rd Edition (2015). The estimate is calculated using standard employment density ratios and estimates of floor areas and may vary significantly from actual employment at the sites.

skilled workforce that promotes further economic growth across the UK as it has done on Phases One and 2a.

### Summary of likely residual significant effects

12.4.14 Any likely residual significant socio-economic effects will be reported in the formal ES.

## 12.5 Effects arising from operation

### Avoidance and mitigation measures

12.5.1 No mitigation measures are proposed in relation to business resources during operation of the Proposed Scheme.

### Assessment of impacts and effects

#### *Resources with direct effects*

12.5.2 It is currently expected that no resources would experience significant direct socio-economic effects during the operation of the Proposed Scheme.

#### *In-combination effects*

12.5.3 In-combination effects will be assessed and reported in the formal ES.

#### *Operational employment*

12.5.4 Direct operational employment created by the Proposed Scheme could lead to indirect employment opportunities for local businesses in terms of potentially supplying the Proposed Scheme or benefiting from expenditure of directly employed workers on goods and services.

12.5.5 The impact of operational employment creation will be assessed and reported at a route-wide level in Volume 3: Route-wide effects.

### Other mitigation measures

12.5.6 No mitigation measures during operation of the Proposed Scheme are proposed in relation to business resources.

### Summary of likely residual significant effects

12.5.7 Any likely residual significant socio-economic effects will be reported in the formal ES.

### Monitoring

12.5.8 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme.

12.5.9 There are no area-specific requirements for monitoring socio-economic effects during the operation of the Proposed Scheme in the Stonebroom to Clay Cross area.

# 13 Sound, noise and vibration

## 13.1 Introduction

13.1.1 This section reports the initial assessment of the noise and vibration likely significant effects arising from the construction and operation of the Proposed Scheme within the Stonebroom to Clay Cross area on:

- 'residential receptors': people, primarily where they live, in terms of individual dwellings and on a wider community basis including any shared community open areas[121]; and
- 'non-residential receptors'[122] such as:
  - community facilities including schools, hospitals, places of worship and 'quiet areas'[123]; and
  - commercial properties such as hotels.

13.1.2 The methodology for the assessment of likely significant noise and vibration effects was developed in alignment with Government noise policy[124], planning policy, planning practice guidance on noise (PPGN)[125] and EIA Regulations as described in the Scope and Methodology Report[126] (SMR).

13.1.3 Engagement has been undertaken with Derbyshire County Council (DCC), Bolsover District Council (BDC) and North East Derbyshire District Council (NEDCC) with respect to the sound, noise and vibration assessment. This engagement process will continue as part of the development of the Proposed Scheme. The purpose of this engagement has been twofold. Firstly, engagement has been undertaken on a route wide basis covering matters including process, scope, method and the approach to baseline and mitigation strategy. Secondly, local engagement has been undertaken to obtain relevant information regarding residential and non-residential receptors and existing baseline sound levels, and to discuss the development of the mitigation to be included in the Proposed Scheme. Officers from local and county authorities are invited to attend and witness baseline sound measurements.

13.1.4 Maps of the Proposed Scheme in the Stonebroom to Clay Cross area showing the location of the key environmental features (Map Series CT-10), key construction features (Map Series CT-05), key operational features (Map Series CT-06) and operational sound, noise and/or vibration impacts and proposed noise mitigation (Map series SV-01), can be found in the Volume 2: LA09 Map Book. Map series SV-01

[121] 'Shared community open areas' are those that the Planning Practice Guidance identifies may partially offset a noise effect experienced by residents at their dwellings and are either a) relatively quiet nearby external amenity spaces for sole use by a limited group of residents as part of the amenity of their dwellings or b) a relatively quiet external publicly accessible amenity space (e.g. park or local green space) that is nearby.
[122] Non-residential receptors with multiple uses would be assessed either based on the most noise sensitive use or would be subject to multiple assessments as appropriate
[2] 'quiet areas' are defined as either Quiet Areas as identified under the Environmental Noise Regulations 2007 (as amended) or are resources which are prized for providing tranquillity as noted in the NPPF and are therefore designated as such under the relevant local plan or are designated under local plans or neighbourhood development plans as local green spaces.
[124] Noise Policy Statement for England, (2015) Department for Environment, Food & Rural Affairs (Defra)
[125] Department for Communities and Local Government (DCLG) (2014), Planning Practice Guidance – Noise. Available online at: https://www.gov.uk/guidance/noise--2
[126] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

also presents key 'non-residential receptors'. These receptors will be reviewed and developed further to incorporate, where appropriate, consultation feedback and ongoing stakeholder engagement.

13.1.5 The assessment of noise and vibration likely significant effects on agricultural, heritage and ecological receptors and the assessment of tranquillity is ongoing and will be reported in the formal ES.

## 13.2 Scope, assumptions and limitations

13.2.1 The approach to assessing sound, noise and vibration and identifying envisaged mitigation is outlined in Volume 1 (Section 8 and Section 9) and the SMR.

13.2.2 In this assessment 'sound' is used to describe the acoustic conditions that people experience as a part of their everyday lives. Noise is taken as unwanted sound and hence adverse effects are noise effects and mitigation is, for example, by noise barriers.

13.2.3 Effects can either be temporary from construction or permanent from the operation of the Proposed Scheme. These effects may be direct, resulting from the construction or operation of the Proposed Scheme, and/or indirect, resulting from changes in traffic patterns on existing roads or railways that result from the construction or operation of the Proposed Scheme.

13.2.4 The effects of construction noise and vibration are assessed qualitatively, based on construction compound locations, construction routes, initial construction estimates and professional judgement. No quantitative assessment has been undertaken for the construction of the Proposed Scheme at this stage. The quantitative assessment will be reported in the formal ES.

13.2.5 The effects on operational noise and vibration are assessed quantitatively based on forecast noise emission from the Proposed Scheme combined with outline baseline information and professional judgement. As baseline information is limited at this stage the quantitative assessment including a full baseline will be reported in the formal ES.

## 13.3 Environmental baseline

13.3.1 The SMR describes the three rounds of baseline data collection covering existing sources, modelling and by targeted monitoring. Baseline sound levels will be published in the formal ES.

13.3.2 The area is predominantly semi-rural, characterised by a mixture of small towns, villages, hamlets, isolated residential properties and farms. The sound environment is generally dominated by local and distant road traffic, rail traffic, neighbourhood sources, with contributing natural and agricultural sounds.

13.3.3 The A61 (Main Road), contributes to the sound environment in this area, from its junction with the A38, past Alfreton, through Higham, Stretton and Clay Cross. Two rail lines also pass through the study area, however the use of these lines is light and they are unlikely to greatly contribute to the sound environment: the Erewash Valley

Line that connects Alfreton with Chesterfield; and the Derwent Valley Line that connects Ambergate with Chesterfield.

13.3.4 Sound levels close to these main transportation routes are high during the daytime and are generally lower at night. Sound levels decrease with increasing distance from the main transportation routes.

13.3.5 The effects of vibration at all receptors are being initially assessed using specific thresholds, below which receptors would not generally be adversely affected by vibration. Further information is provided in Volume 1, Section 8.

13.3.6 The baseline assessment presented in the formal ES will consider current sound levels and how these may change in the future. This will include any changes firstly due to national trends such as road traffic growth and the progressive electrification of road vehicles and secondly due to area specific changes caused either by local committed development and/or noise reduction provided in Important Areas identified in Defra's Noise Action Plans for Agglomerations[127], Roads[128] or Railways[129]. HS2 Ltd will engage with the Competent Authorities responsible for the relevant Important Areas. Map Series SV-01 (Volume 2: LA09 Map Book) shows any noise Important Areas in the Stonebroom to Clay Cross area.

## 13.4 Effects arising during construction

### Assumptions and limitations

13.4.1 The construction arrangements that form the basis of the assessment are presented in Section 2.3 of this report, in Volume 1, Section 8 and in the draft Code of Construction Practice (CoCP)[130]. The assessment focuses on the initial identification of communities that may be affected by construction noise. The formal ES will include the assessment of likely significant effects from construction noise and/or vibration on individual receptors and communities.

13.4.2 Morton Cutting involves construction works in proximity to Morton, including construction of the piling platform, pile cap construction and installation of beams and concreting, which have been assumed to be undertaken during the evening and night-time for reasons of safety, engineering practicability or to reduce the impact on existing transport.

13.4.3 The assessment takes account of people's sensitivity to noise during the day, evening and night. More stringent criteria are applied during evening and night-time periods, compared to the busier and more active daytime period.

[127] Noise Action Plan: Agglomerations (large urban areas) (2014) Department for Environment, Food & Rural Affairs
[128] Noise Action Plan: Roads (including major roads) (2014) Department for Environment, Food & Rural Affairs
[129] Noise Action Plan: Railways (including major railways) (2014) Department for Environment, Food & Rural Affairs
[130] Supporting document: Draft Code of Construction Practice

## Avoidance and mitigation measures

13.4.4 The assessment assumes the implementation of the principles and management processes set out in the noise and vibration section of the draft CoCP (Section 13), which are:

- Best practicable means (BPM) as defined by the Control of Pollution Act 1974 (CoPA) and Environmental Protection Act 1990 (EPA), which will be applied during construction activities to minimise noise (including vibration) at neighbouring residential properties and other sensitive receptors[131].
- As part of BPM, mitigation measures are applied in the following order:
  - noise and vibration control at source: for example, the selection of quiet and low vibration equipment, review of construction methodology to consider quieter methods, location of equipment on-site, control of working hours, the provision of acoustic enclosures and the use of less intrusive alarms, such as broadband vehicle reversing warnings;
  - screening: for example, local screening of equipment or perimeter hoarding or the use of temporary stockpiles; and
  - where, despite the implementation of BPM, the noise exposure exceeds the criteria defined in the draft CoCP, noise insulation or ultimately temporary re-housing would be offered at qualifying properties.
- Lead contractors will seek to obtain prior consent from the relevant local authority under Section 61 of the CoPA for the proposed construction works. The consent application will set out BPM measures to minimise construction noise and vibration, including control of working hours, and provide a further assessment of construction noise and vibration, including confirmation of noise insulation/temporary re-housing provision.
- Contractors would undertake and report such monitoring as is necessary to assure and demonstrate compliance with all noise and vibration commitments. Monitoring data would be provided regularly to, and be reviewed by, the nominated undertaker and made available to the local authorities.
- Contractors would be required to comply with the terms of the CoCP and appropriate action would be taken by the nominated undertaker as required to ensure compliance.

13.4.5 Noise insulation or, where appropriate, temporary re-housing would avoid residents of qualifying properties being significantly affected by levels of construction noise inside their dwellings. Work is being undertaken to provide a reasonable worst case estimate of the buildings that are likely to qualify for such measures and the estimate will be reported in the formal ES.

[131] Including local businesses and quiet areas designated by the local authority

13.4.6 Qualification for noise insulation and temporary re-housing would be confirmed as part of seeking prior consent from the local authority under Section 61 of the CoPA. Qualifying properties would be identified, as required in the draft CoCP so that noise insulation could be installed, or any temporary re-housing provided, before the start of the works predicted to exceed noise insulation or temporary re-housing criteria.

## Assessment of impacts and effects

13.4.7 Potential construction airborne noise significant effects could occur at the communities, or those parts of the communities, that are nearest to the Proposed Scheme in the following locations, as a result of the construction works illustrated on Map Series CT-05 (Volume 2: LA09 Map Book):

- Stonebroom, arising from construction activities such as embankment formation, balancing pond construction, ecological pond construction and landscape bund construction; and
- Morton, arising from construction activities such as use of transfer node, embankment formation, balancing pond construction, underbridge construction and landscape bund construction.

13.4.8 Map Series SV01 (Volume 2: LA09 Map Book) shows key non-residential properties that have been identified within the study area as defined in the SMR. The initial assessment has not identified any likely significant effects at non-residential receptors.

13.4.9 The avoidance and mitigation measures to be implemented would avoid or reduce airborne construction noise adverse likely significant effects. Residual temporary noise or vibration likely significant effects will be reported in the formal ES.

13.4.10 Construction traffic on the following local roads has the potential, on a precautionary basis, to cause adverse noise or vibration effects on the nearest parts of residential communities and nearest noise sensitive non-residential receptors:

- the B6026 (Newton Road) and B6014 (Doe Hill Lane/Station Road/Main Road/Stretton Road/Morton Road) between Newton and Stretton;
- Pewit Lane, between B6014 (Doe Hill Lane) and Morton Road;
- Pilsley Road, Morton Road, Station Road and Hardstoft Road, between Pilsley and B6039 (Chesterfield Road);
- Love Lane and Stonebroom Lane, East of Stonebroom;
- Evershill Lane between the Proposed Scheme boundary and the A61; and
- Lime Tree Grove, Beech Way, Cemetery Road, Pilsley Road, Coney Green Road, Furnace Hill Road and Bridge Street between Lime Tree Grove in Danesmoor and A6175 Market Street in Clay Cross.

13.4.11 The magnitude and extent of effect will depend on the level of construction traffic using the road. Any residual significant temporary noise or vibration effects will be reported in the formal ES.

### Other mitigation measures

13.4.12 Further work is being undertaken to confirm the likely significant effects and identify any site-specific mitigation, or amendment to construction routes considered necessary in addition to the general measures set out in the draft CoCP. Any site-specific mitigation will be presented in the formal ES and would include an estimate of the number of properties that may qualify for noise insulation or temporary re-housing under provisions set out in the draft CoCP.

### Summary of likely residual significant effects

13.4.13 Further work is being undertaken to confirm significant construction noise and vibration effects, including any temporary indirect effects from construction traffic.

## 13.5 Effects arising from operation

### Assumptions and limitations

13.5.1 The assessment of the effects of noise and vibration from the operation of the Proposed Scheme is based on the envisaged design as described in Section 2.3 and in Volume 1 (Sections 4 and 8). The highest likely train flows, assuming the service pattern including Phase One and Phase Two services. The expected passenger service frequency for Phase 2b is described in Volume 1 (Section 4) and as outlined below for the Stonebroom to Clay Cross area.

13.5.2 Passenger services would start at or after 05:00 from the terminal stations. In this area, with Phase One and Phase Two in operation, after 05:00 services would progressively increase to four trains per hour in each direction on the Sheffield Southern spur with an operating speed up to around 200kph. This number of services is assumed to operate every hour from 07:00 to 21:00. The number of services would progressively decrease after 21:00 and the last service would arrive at terminal stations by midnight. Further information on train flows is presented in Volume 1, Section 4.

### Avoidance and mitigation measures

13.5.3 The development of the Proposed Scheme alignment has sought to reduce noise impact insofar as reasonably practicable.

13.5.4 Envisaged avoidance and mitigation measures that apply route-wide are described in Volume 1, Section 9.

#### *Airborne noise*

13.5.5 Through the procurement process for the trains and the track, the use of proven international technology would enable the railway to be quieter than implied by current minimum European standards. Details of operational train noise would be provided in the formal ES. Overall it is assumed that proven international technology would reduce noise emissions by approximately 3dB at 360kph (225mph) compared to the current minimum European standards[132].

[132] Technical Specification for Interoperability (TSI) Noise – EU Commission Regulation No 1304/2014

13.5.6 Noise effects would be reduced along the route by engineering structures provided to avoid or reduce significant visual effects.

13.5.7 As required by statute, noise insulation measures would be offered for qualifying buildings as defined in the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 and the Noise Insulation Regulations 1975 ('the NI Regulations'). Additionally, HS2 Ltd will apply more onerous criteria, to provide the same mitigation as defined in 'the NI Regulations' at residential buildings where[133] noise from the use of the Proposed Scheme measured outside a dwelling exceeds the Interim Target defined by the World Health Organization's (WHO) Night Noise Guidelines for Europe[134] or the maximum noise level criteria[135] defined in the SMR. Noise insulation is designed to avoid residents experiencing any residual significant effect on health and quality of life from resulting noise inside their dwelling.

### *Ground-borne noise and vibration*

13.5.8 Significant ground-borne noise or vibration effects would be avoided or reduced through the design of the track and track-bed.

## Assessment of impacts and effects

13.5.9 Map Series SV-01 (Volume 2: LA09 Map Book) indicates the likely long-term daytime noise level (defined as the equivalent continuous sound level from 07:00 to 23:00 or $L_{pAeq,day}$) from HS2 operations alone. The contours are shown in 5dB steps from 50dB to 70dB. With the train flows described in Volume 1, the night-time noise level (defined as the equivalent continuous noise level from 23:00 to 07:00 or $L_{pAeq,night}$) from the Proposed Scheme would be approximately 10dB lower than the daytime sound level. The 50dB contour, therefore, indicates the distance from the Proposed Scheme at which the night time noise level would be 40dB. This contour represents where adverse noise effects may start to be observed during the day (with respect to annoyance) and night (with respect to sleep disturbance). With regard to sleep disturbance the assessment also takes account of the maximum noise levels generated by each train pass by as defined in the SMR.

13.5.10 The potential for noise effects that are considered significant on a community basis in areas between the 50dB and 65dB daytime noise contours, or 40dB and 55dB night-time contours, is dependent on the baseline in that area and the change in level brought about by the Proposed Scheme. Baseline information will be confirmed in the formal ES.

13.5.11 A summary of the likely significant effects identified on a precautionary basis is presented at the end of this section.

13.5.12 Likely significant airborne noise effects arising from permanent changes to existing roads, will be reported in the formal ES.

[133] Following Government's National Planning Practice Guidance. Available online at: https://www.gov.uk/government/collections/planning-practice-guidance
[134] World Health Organization (2010), *Night time Noise Guidelines for Europe*
[135] Dependent on the number of train passes

## Other mitigation measures

13.5.13 Further work is being undertaken to confirm the extent, location and type of the noise mitigation to be included within the design of the Proposed Scheme, which will be reported in the formal ES.

## Summary of likely residual significant effects

13.5.14 Mitigation, including landscape earthworks, described in Volume 1 (Section 9), Section 2.2 and presented in Map Series SV-01 (Volume 2: LA09 Map Book) and Map Series CT-06 (Volume 2: LA09 Map Book), would substantially reduce the potential airborne noise effects that would otherwise arise from the Proposed Scheme. It is anticipated that the mitigation would avoid likely significant adverse effects due to airborne operational noise on the majority of receptors and communities.

13.5.15 Taking account of the avoidance and mitigation measures this initial assessment has identified no airborne noise effects with the potential to be considered significant on a community basis due to increased noise levels forecast to arise from the operation of the Proposed Scheme in line with the SMR.

13.5.16 The initial assessment indicates that, the forecast noise from long-term railway operation would not exceed the daytime threshold set by the Noise Insulation Regulations, the night-time Interim Target identified in the WHO Night Noise Guidelines for Europe 2009 or the maximum noise levels criteria set out in the SMR, at individual residential properties closest to the Proposed Scheme in the Stonebroom to Clay Cross area.

13.5.17 The initial assessment indicates that there would be no significant effects identified at any non-residential receptors in this community area as a result of operational noise.

13.5.18 Further assessment work is being undertaken to identify operational noise and vibration significant effects. This will be reported in the formal ES.

13.5.19 HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid these significant effects. In doing so HS2 Ltd will continue to engage with stakeholders to fully understand the potentially affected receptor, its use and the benefit of the measures.

## Monitoring

13.5.20 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme.

13.5.21 Operational noise and vibration monitoring would be carried out at different times during the lifetime of the Proposed Scheme at a combination of carefully selected monitoring locations including: adjacent or attached to moving vehicles; at fixed positions or in the vicinity of individual assets; and locations within the surrounding areas and communities alongside the railway corridor.

13.5.22 The expected noise and vibration performance of the Proposed Scheme, operational noise and vibration measurement data, associated asset information, description of corrective actions, results of measured performance compared to expected conditions, and monitoring reports would be shared with the relevant local authorities at appropriate intervals.

# 14 Traffic and transport

## 14.1 Introduction

14.1.1 This section considers the likely impacts on all forms of transport and the potential likely significant effects identified to date on transport users arising from the construction and operation of the Proposed Scheme through the Stonebroom to Clay Cross area.

14.1.2 Engagement with Derbyshire County Council (DCC) and Sheffield City Region (SCR) has been undertaken. An important focus of this engagement has been to obtain relevant baseline information and discuss transport survey requirements and assessment methodology. This engagement process will continue as part of the development of the Proposed Scheme.

14.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2: LA09 Map Book.

## 14.2 Scope, assumptions and limitations

14.2.1 The scope, key assumptions and limitations for the traffic and transport assessment are set out in Volume 1 (Section 8) and the Scope and Methodology Report (SMR)[136].

14.2.2 The study area for traffic and transport includes: Tibshelf; Stonebroom; Morton; Stretton; Pilsley; Lower Pilsley and Clay Cross.

14.2.3 The study area also includes all roads potentially affected by the Proposed Scheme including the following local roads: the A61 Main Road/Stretton Road/High Street; the A6175 Market Street; the B6014 Doe Hill Lane/Station Road/Main Road/Stretton Road/Morton Road; the B6025 Alfreton Road; the B6026 Newton Road; Love Lane; Stonebroom Lane; Evershill Lane; Pilsley Road (south of Pilsley); Morton Road; Pewit Lane; Station Road (North Wingfield); Hardstoft Road; Lime Tree Grove; Beech Way; Cemetery Road; Pilsley Road (Danesmoor); Coney Green Road; Harris Way; Bridge Street; and Furnace Hill Road.

14.2.4 The potential effects on traffic and transport have been assessed qualitatively, based on the Proposed Scheme design, proposed construction routes, initial estimates of construction traffic and professional judgement.

14.2.5 No quantitative assessment has been undertaken at this stage. A quantitative assessment will be presented in the formal ES.

## 14.3 Environmental baseline

### Existing baseline

14.3.1 Existing conditions in the study area have been determined through site visits, traffic and transport surveys, liaison with DCC and SCR (including provision of information

[136] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

on public transport, public rights of way (PRoW) and accident data) and desktop analysis.

### *Surveys*

14.3.2 Traffic surveys, comprising junction turning counts and queue surveys and automatic traffic counts, were undertaken in June, July and November 2017. These data have been supplemented by existing traffic data from other sources, including from DCC. Assessment of the data indicates that the peak hours in the area are 07:45-08:45 and 16:00-17:00. However, there are only small differences (4% to 7%) between the observed peak hours and the periods 08:00-09:00 and 17:00-18:00, which are the periods when HS2 construction traffic movements and workforce arrivals and departures would have the maximum impact. Consequently, the 08:00-09:00 and 17:00-18:00 periods have been used as the assessment hours representing a reasonable worst case.

14.3.3 PRoW surveys were undertaken in August and September 2017 to establish their nature and usage by non-motorised users (pedestrians, cyclists and equestrians). The surveys included PRoW and roads that would cross the route of the Proposed Scheme, and any additional PRoW and roads that may be affected by the Proposed Scheme. The majority of the PRoW surveys were undertaken during the weekend, at times when recreational use is expected to be highest, but where routes are likely to be used for non-leisure uses such as commuting, surveys were undertaken on a weekday.

### *Strategic and local highway network*

14.3.4 There are no strategic routes that pass through the area. The M1 is located a short distance to the east of the route of the Proposed Scheme within the adjacent Tibshelf to Shuttlewood area.

14.3.5 The local roads that could be affected by the Proposed Scheme include: the A61 Main Road/Stretton Road/High Street; the A6175 Market Street; the B6014 Doe Hill Lane/Station Road/Main Road/Stretton Road/Morton Road; the B6025 Alfreton Road; the B6026 Newton Road; Beech Way; Bridge Street; Cemetery Road; Coney Green Road; Evershill Lane; Furnace Hill Road; Hardstoft Road; Harris Way; Lime Tree Grove; Love Lane; Morton Road; Pewit Lane; Pilsley Road (Danesmoor); Pilsley Road (south of Pilsley); Station Road (North Wingfield) and Stonebroom Lane. The local road network is busy at peak times and delays can be experienced on the A61 and the A6175 including the approach roads in the Clay Cross area. The remainder of the local road network generally operates well although some localised delays can be experienced, particularly at peak times.

14.3.6 Relevant accident data for the road network subject to assessment have been obtained from the Department for Transport[137]. Data for the three-year period December 2014-December 2017 have been assessed and any identified clusters (i.e. where there are nine or more accidents in the three-year period) have been examined.

[137] Department for Transport; Crashmap.co.uk; www.crashmap.co.uk. CrashMap provides accident data for the UK.

14.3.7 No accident clusters were identified within the Stonebroom to Clay Cross area.

14.3.8 The route of the Proposed Scheme would cross three roads with footways within the Stonebroom to Clay Cross area. These are: the B6014 Doe Hill Lane/Station Road; Pilsley Road (south of Pilsley); and Stonebroom Lane. In addition, the B6025 Alfreton Road has no footways but was observed to be used by pedestrians.

### *Parking and loading*

14.3.9 There is no parking or loading identified in the Stonebroom to Clay Cross area that is expected to be impacted by the Proposed Scheme. Consequently, this topic is not considered further in this assessment.

### *Public transport network*

14.3.10 Four bus routes operate on four roads that would be crossed by the route of the Proposed Scheme in the Stonebroom to Clay Cross area. There are also bus stops primarily located to serve the main built up areas. The bus routes that could be affected by the Proposed Scheme include:

- the B6014 Doe Hill Lane: Service 149 (Alfreton - Mickley - Tibshelf - Hilcote - Sutton); and Service SP1 (Chesterfield - Clay Cross - Tibshelf - Sutton);
- the B6014 Station Road: Service 149 (Alfreton - Mickley - Tibshelf - Hilcote - Sutton); and Service 150 (Matlock - Wessington - Alfreton - Clay Cross), Service SP1 (Chesterfield - Clay Cross - Tibshelf - Sutton);
- Stonebroom Lane: Service 55 (Alfreton - Clay Cross – Wingerworth - Chesterfield); and Service 150 (Matlock - Wessington - Alfreton - Clay Cross); and
- Pilsley Road: Service 150 (Matlock - Wessington - Alfreton - Clay Cross); and Service SP1 (Chesterfield - Clay Cross - Tibshelf - Sutton).

14.3.11 National and local rail services are accessible via Chesterfield Station (north of the Stonebroom to Clay Cross area) and Alfreton Station (located on the Erewash Valley line within the Pinxton to Newton and Huthwaite area). Chesterfield Station provides access to national services between London and Sheffield, Birmingham and Newcastle, Plymouth and Edinburgh/Glasgow Central, and Nottingham and Liverpool Lime Street. Alfreton Station provides access to national services between Nottingham and Leeds, and Norwich and Liverpool.

### *Non-motorised users*

14.3.12 There are pedestrian footways adjacent to many of the roads in the built up areas of Tibshelf, Stonebroom, Morton, Stretton, Pilsley, Lower Pilsley, Clay Cross and Danesmoor. Footways vary in width and condition within these areas. Where there is no formal footway provision adjacent to a road, non-motorised user numbers are generally low.

14.3.13 The route of the Proposed Scheme would cross the route of three PRoW and two other non-motorised user routes (Silverhill Trail and Doe Hill Community Park footpath (in two places)) within the Stonebroom to Clay Cross area that could be

affected either temporarily or permanently due to, for example, temporary diversion of PRoW during construction and permanent diversions or upgrades including for maintenance access to the Proposed Scheme. The survey undertaken to inform the assessment showed that the routes with the greatest usage during the survey day were: the Silverhill Trail used by 47 pedestrians, 47 cyclists and 9 equestrians; and the B6025 Alfreton Road used by 59 pedestrians, 56 cyclists and 13 equestrians.

14.3.14 In the Stonebroom to Clay Cross area, National Route 67 (part of the National Cycle Network) is an 'off-road' route that passes through the area to the south of Tibshelf. This follows the 'Silverhill Trail', part of the Derbyshire Phoenix Greenways network of accessible multi-user paths and connects into the 'Five Pits Trail' that continues north between Tibshelf and Holmewood (located within the Tibshelf to Shuttlewood area). A further recommended cycle route connects Blackwell to Stonebroom via Gloves Lane and Love Lane.

### *Waterways and canals*

14.3.15 There are no navigable waterways in the Stonebroom to Clay Cross area. Consequently, this topic is not considered further in this assessment.

### *Air transport*

14.3.16 There is no relevant air transport in the Stonebroom to Clay Cross area. Consequently, this topic is not considered further in this assessment.

## 14.4 Effects arising during construction

### Avoidance and mitigation measures

14.4.1 The following measures are currently proposed to avoid or reduce effects on transport users:

- new highways (roads and PRoW) would be constructed and operational prior to the permanent closure of any existing highways, insofar as reasonably practicable;
- the majority of roads crossing the route of the Proposed Scheme would be maintained or locally diverted during construction to limit the need for diversions of traffic onto alternative routes;
- traffic management measures would be implemented to limit any disruption;
- road closures would be restricted to overnight and weekends, insofar as reasonably practicable;
- temporary alternative routes for PRoW would be provided during construction, insofar as reasonably practicable, where either the existing or final proposed route is not available;
- where reasonably practicable, site haul routes would be created adjacent to the route of the Proposed Scheme to transport construction materials and equipment to reduce heavy goods vehicle (HGV) movements on public roads with access taken via the main road network;

- HGV would be routed, insofar as reasonably practicable, along the strategic and/or primary road network;
- the use of the local road network would, insofar as reasonably practicable, be limited to use for site set-up, access for surveys and on-going servicing (including refuse collection and general deliveries to compounds) during construction;
- the reuse of excavated material along the route of the Proposed Scheme, insofar as reasonably practicable;
- highway measures including junction improvements, passing places and carriageway widening would be provided, as required, to manage the safe passing of construction vehicles on construction HGV routes; and
- on-site welfare facilities would be provided which would reduce daily travel by site workers.

14.4.2 Section 14 of the draft Code of Construction Practice (CoCP)[138, 139] includes measures that aim to reduce the adverse impacts and effects on local communities and maintain public access. This includes the impacts of deliveries of construction materials and equipment.

14.4.3 The measures in the draft CoCP include controls on vehicle types, hours of site operation and routes for HGVs to reduce the impact of road-based construction traffic. In order to achieve this, general and site specific traffic management measures would be implemented during the construction of the Proposed Scheme on or adjacent to public roads and PRoW affected by the Proposed Scheme.

14.4.4 The draft CoCP includes the requirement to develop local traffic management plans in consultation with the highway and traffic authorities and the emergency services. These would consider the local traffic management strategy including consideration of sensitive receptors, such that adverse impacts would be reduced insofar as reasonably practicable and any effect on safety and accidents would not be significant

14.4.5 Specific measures would include core site operating hours of 08:00-18:00 on weekdays and 08:00-13:00 on Saturdays with site staff and workers generally arriving before the morning peak hour and departing after the evening peak hour.

14.4.6 The number of private car trips to and from the construction compounds (both workforce and visitors) would be reduced by encouraging alternative sustainable modes of transport or vehicle sharing. This would be supported by an overarching framework travel plan that would require construction workforce travel plans[140] to be produced that would include a range of potential measures to mitigate the impacts of

[138] Supporting document: Draft Code of Construction Practice
[139] A draft CoCP has been prepared. It will remain a draft document through the parliamentary process and will be finalised at Royal Assent. The CoCP sets out measures to be implemented by the nominated undertaker
[140] Construction and operational travel plans would promote the use of sustainable transport modes as appropriate to the location and types of trip. They would include measures such as: provision of information on and promotion of public transport services; provision of good cycle and pedestrian facilities; liaison with public transport operators; promotion of car sharing; and the appointment of a travel plan coordinator to ensure suitable measures are in place and are effective.

traffic and transport movements associated with construction of the Proposed Scheme.

14.4.7 Where works potentially affect Network Rail assets, disruption to travelling passengers and freight movements would be reduced insofar as reasonably practicable. This includes measures such as:

- programming the construction works to coincide with the possessions that are required and planned by Network Rail for the general maintenance of their railway;
- planning the required construction works so that they can be undertaken in short overnight stages so that passenger services are not disrupted; and
- programming longer closures at the weekend and on bank holidays to reduce insofar as reasonably practicable the number of passengers affected.

## Assessment of impacts and effects

### *Temporary effects*

14.4.8 The traffic and transport impacts during the construction period within the Stonebroom to Clay Cross area are likely to include:

- construction vehicle movements to and from the various construction compounds;
- road closures and associated realignments and diversions;
- alternative routes for PRoW; and
- possessions on the conventional rail network.

14.4.9 The construction assessment has also considered any impacts in the Stonebroom to Clay Cross area that arise from construction of the Proposed Scheme in the adjoining community areas.

14.4.10 Construction vehicle movements required to construct the Proposed Scheme would include the delivery of plant and materials, movement of excavated materials and site worker trips. Works would include utilities diversions, earthworks, underpass, viaduct, bridge and highway construction.

14.4.11 Construction activities would be managed from compounds. Details of the construction compounds are provided in Section 2.3. The locations of the compounds are shown in Map Series CT-05 in the Volume 2: LA09 Map Book

#### Strategic and local road network traffic

14.4.12 The primary HGV access routes for construction vehicles would be the strategic and/or primary road network with the use of the local road network limited, insofar as reasonably practicable. The construction routes would also provide access to compounds. Where reasonably practicable, HGVs would use the site haul routes alongside the route of the Proposed Scheme to reduce the impact on the local road network. In this area, it is expected that the main construction routes would use:

- the A61 Main Road/Stretton Road/High Street between the B6014 Morton Road and Harris Way;
- the A6175 Market Street between Furnace Hill Road and the Tibshelf to Shuttlewood area;
- the B6014 Doe Hill Lane/Station Road/Main Road/Stretton Road/Morton Road;
- the B6025 Alfreton Road between the B6014 Doe Hill Lane and B6026 Newton Road;
- the B6026 Newton Road between the B6025 Alfreton Road and Sunny Bank;
- Love Lane;
- Stonebroom Lane between the B6014 Doe Hill Lane and Love Lane;
- Pilsley Road (south of Pilsley);
- Evershill Lane;
- Pewit Lane;
- Morton Road;
- Station Road (North Wingfield);
- Hardstoft Road;
- Lime Tree Grove;
- Beech Way between Cemetery Road and Lime Tree Grove;
- Cemetery Road between Pilsley Road (Danesmoor) and Beech Way;
- Pilsley Road (Danesmoor) between Cemetery Road and Coney Green Road;
- Coney Green Road;
- Harris Way;
- Bridge Street; and
- Furnace Hill Road.

14.4.13 A number of these construction routes would have limited use[141] including Love Lane, Stonebroom Lane and Evershill Lane.

14.4.14 In addition to increases in traffic flows due to construction traffic, construction of the Proposed Scheme is expected to result in temporary highway closures and diversions or realignments as set out in Section 2.3. The works to construct both temporary and permanent highway diversions/realignments could also result in disruption to highway users. These are expected to include:

[141] Limited use refers to a low level of HGV use generally over a short length of time, for example for site set up or minor works

- temporary closure of the B6014 Doe Hill Lane/Station Road between Pilsley Road (south of Pilsley) and Pewit Lane, with local diversion routes available;
- local realignment of the B6025 Alfreton Road, between Alport Terrace and the B6026 Newton Road;
- local realignment of Stonebroom Lane between the B6014 Doe Hill Lane/Station Road and Love Lane; and
- overnight and weekend closures of Pilsley Road (south of Pilsley) between the B6014 Station Road and Pewit Lane.

14.4.15 Permanent changes to highways are reported under operation.

14.4.16 Changes in traffic have the potential, at some locations, to result in increased travel distance, congestion and delays and increased traffic severance for non-motorised users. The assessment of these changes will be reported in the formal ES.

14.4.17 Assessment of the traffic and transport impacts from utilities works, either separately or in combination with other works, will be reported in the formal ES.

### Accidents and safety

14.4.18 Changes in traffic as a result of the Proposed Scheme could result in changes in accident risk. The impacts on accident risk during construction of the Proposed Scheme will be reported in the formal ES.

### Public transport network

14.4.19 It is expected that construction of the Proposed Scheme would require temporary bus route diversions, including bus routes 149 and SP1. The routes would be diverted via Pewit Lane and Pilsley Road (south of Pilsley), increasing the length of the route by approximately 1km. This could result in increased journey times and the need to relocate bus stops. Any consequent effects will be reported in the formal ES.

14.4.20 There are interfaces with the existing rail network in this area, in particular on the operation of the Erewash Valley Line and its rail services. A number of rail possessions would be required to undertake localised works, including construction of the Morton Cutting. This could potentially result in disruption to existing rail services, although many of the interventions would be combined to reduce the frequency of potential disruption. The effects of railway possessions will be assessed and reported in the formal ES.

### Non-motorised users

14.4.21 The construction works associated with the Proposed Scheme would require the temporary closure or diversion/realignment of PRoW and roads. There would be temporary alternative routes for a number of PRoW in the vicinity of the Proposed Scheme. Where necessary, PRoW would be re-routed around construction compounds.

14.4.22 There would be temporary alternative routes for a number of PRoW in the vicinity of the Proposed Scheme. It is currently expected that the following PRoW would be temporarily diverted or realigned:

- Silverhill Trail (south of Banks Farm);
- Doe Hill Community Park footpath (towards the southern end of Doe Hill Community Park);
- Morton Bridleway 8 (near Padleywood Farm); and
- Pilsley Footpath 7 (west of Bushypark Farm).

14.4.23 Permanently diverted PRoW are reported under operation, although these PRoW could also be subject to temporary closure or diversion/realignment.

14.4.24 The changes to PRoW are likely to result in some increases in travel distance with the potential for adverse significant effects. The assessment of these will be reported in the formal ES.

### *Permanent effects*

14.4.25 Any permanent effects of construction will be considered in the assessment of operation for traffic and transport. This is because the impacts and effects of ongoing increases in travel demand and the wider impacts and effects of the operations phase need to be considered together.

## Other mitigation measures

14.4.26 The implementation of the measures in the draft CoCP, in combination with the construction workforce travel plan would help mitigate transport-related effects during construction of the Proposed Scheme.

14.4.27 Any further traffic and transport mitigation measures required during the construction of the Proposed Scheme will be considered based on the outcomes of the assessment. These will be reported in the formal ES.

## Summary of likely residual significant effects

14.4.28 Construction of the Proposed Scheme has the potential to lead to additional congestion and delays for road users on a number of routes including: the A61 Main Road/Stretton Road/High Street; the A6175 Market Street; the B6014 Doe Hill Lane/Station Road/Main Road/Stretton Road/Morton Road; the B6025 Alfreton Road; B6026 Newton Road; Love Lane; Stonebroom Lane; Evershill Lane; Pilsley Road (south of Pilsley); Pewit Lane; Morton Road; Station Road (North Wingfield); Hardstoft Road; Lime Tree Grove; Beech Way; Cemetery Road; Pilsley Road (Danesmoor); Coney Green Road; Harris Way; Bridge Street; and Furnace Hill Road. Increases in traffic could also result in increased traffic severance for non-motorised users of the routes and changes in traffic could result in changes in accident risk.

14.4.29 Construction of the Proposed Scheme is also likely to result in the temporary closures and diversions or realignments of the following: the B6025 Alfreton Road; the B6014 Doe Hill Lane/Station Road; Stonebroom Lane; and Pilsley Road (south of Pilsley).

14.4.30 Construction of the Proposed Scheme would require bus route diversions, including: bus routes 149 and SP1. This could result in increased journey times and the need to relocate bus stops.

14.4.31 Construction of the Proposed Scheme has the potential to result in delays to rail services and passengers on the Erewash Valley Line as a result of rail possessions.

14.4.32 Construction of the Proposed Scheme would require the temporary closure or diversion/realignment of PRoW and non-motorised user routes, including: the Silverhill Trail; Doe Hill Community Park footpath; Morton Bridleway 8; and Pilsley Footpath 7, and users would be temporarily diverted at different times during the construction period. This could result in significant adverse effects on users.

14.4.33 The assessment of significant effects in relation to traffic and transport during construction of the Proposed Scheme will be reported in the formal ES.

## 14.5 Effects arising from operation

### Avoidance and mitigation measures

14.5.1 The following measures have been included as part of the design of the Proposed Scheme and would avoid or reduce impacts on transport users:

- reinstatement of roads on or close to their existing alignments, where reasonably practicable; and
- replacement, diversion or realignment of PRoW.

### Assessment of impacts and effects

14.5.2 The following section considers the impacts on traffic and transport and the likely consequential effects resulting from the operational phase of the Proposed Scheme. Operational effects arising from the Proposed Scheme in year 2033 and year 2046 will be reported in the formal ES.

#### *Key operation transport issues*

14.5.3 The Proposed Scheme would have beneficial effects for rail passengers including increased rail capacity on the Proposed Scheme and associated substantial reductions in journey times between Chesterfield, the Midlands and London.

14.5.4 Although there is the potential for some increase in traffic in the Stonebroom to Clay Cross area from users of the improved rail services at Chesterfield, the operation of the Proposed Scheme would be unlikely to have any substantial impacts within this area due to increased traffic, as there are no stations or depots proposed within the Stonebroom to Clay Cross area. The maintenance of the Proposed Scheme would generate limited vehicular trips and the effect would not be significant.

14.5.5 The operational impacts are therefore primarily related to permanent diversion, realignment and closure of roads and the diversion or closure of PRoW.

### *Highway network*

#### Strategic and local highway network

14.5.6 The Proposed Scheme would result in a number of permanent highway changes. These include:

- realignment of the B6025 Alfreton Road via an overbridge between the B6026 Newton Road and Gloves Lane;
- lowering of the B6014 Doe Hill Lane adjacent to the Erewash Valley Line; and
- realignment of Stonebroom Lane where it meets Doe Hill Lane.

14.5.7 The permanent highway changes are not expected to result in significant changes in travel distances. In addition, the changes to travel patterns as a result of people travelling to Chesterfield station are not expected to lead to significant effects in the Stonebroom to Clay Cross area. The effects of these changes, including on non-motorised users, will be reported in the formal ES.

#### Accidents and safety

14.5.8 Changes in traffic could result in changes in accident risk. Operational effects arising from the Proposed Scheme will be reported in the formal ES.

### *Public transport network*

14.5.9 It is expected that the Proposed Scheme would generate significant beneficial effects for rail passengers that use Chesterfield Station located to the north of the Stonebroom to Clay Cross area, as a result of:

- the increase in rail capacity at Chesterfield Station and from the introduction of HS2 services; and
- significantly improved journey times between Chesterfield, the Midlands and south of the UK, as detailed in Volume 1, Section 4.

14.5.10 The Proposed Scheme is not expected to have a significant effect on public transport operations in the Stonebroom to Clay Cross area.

### *Non-motorised users*

14.5.11 A number of PRoW that cross the route of the Proposed Scheme would be either permanently realigned or diverted including:

- Tibshelf Bridleway 5 would be permanently realigned to the east of its existing alignment, where it would cross the Proposed Scheme via an accommodation underbridge shared with the Silverhill Trail, before reconnecting with its existing alignment;
- the eastern section of the Doe Hill Community Park footpath would be realigned with a new overbridge, and the western section would be permanently closed;
- Morton Bridleway 8 would be realigned via an overbridge near Padleywood Farm; and
- Pilsley Footpath 7 would be realigned via an overbridge near Bushypark Farm.

14.5.12 The realignment of some of the PRoW would increase journey distance and time for non-motorised users and may result in significant effects. No diversion is expected to require additional travel distance in excess of 500m. The assessment of changes will be reported in the formal ES.

## Other mitigation measures

14.5.13 HS2 Ltd is continuing to engage with local highway and transport authorities regarding the need for highway and public transport measures to mitigate the impacts of the Proposed Scheme in the area.

14.5.14 Any further traffic and transport mitigation measures required during the operation of the Proposed Scheme will be considered based on the outcomes of the assessment. These will be reported in the formal ES.

## Summary of likely residual significant effects

14.5.15 Operation of the Proposed Scheme would require the permanent realignment of the B6014 Doe Hill Lane; the B6025 Alfreton Road; and Stonebroom Lane.

14.5.16 Changes in traffic as a result of the operation of the Proposed Scheme could result in changes in accident risk.

14.5.17 It is expected that the Proposed Scheme would have beneficial effects for rail passengers including increased rail capacity on the Proposed Scheme and associated substantial reductions in journey times between Chesterfield, the Midlands and London.

14.5.18 Operation of the Proposed Scheme would require the permanent realignment or diversion of three PRoW and one non-motorised user route including: Tibshelf Bridleway 5; Morton Bridleway 8; Pilsley Footpath 7; and Doe Hill Community Park footpath.

14.5.19 The assessment of significant effects in relation to traffic and transport during operation of the Proposed Scheme will be reported in the formal ES.

## Monitoring

14.5.20 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme.

14.5.21 There are no area-specific monitoring requirements currently proposed for traffic and transport in the Stonebroom to Clay Cross area.

# 15 Water resources and flood risk

## 15.1 Introduction

15.1.1 This section provides a description of the current baseline for water resources and flood risk in the Stonebroom to Clay Cross area. The likely impacts and significant effects identified to date arising from the construction and operation of the Proposed Scheme on surface water and groundwater bodies and their associated water resources are reported. The likely impacts and significant effects of the Proposed Scheme on flood risk and land drainage are also reported.

15.1.2 Engagement has been undertaken with the Environment Agency, Canal & River Trust (CRT), North East Derbyshire District Council (NEDDC), Bolsover District Council (BDC) and Derbyshire County Council (DCC) which is the Lead Local Flood Authority (LLFA). Engagement has also been undertaken with Severn Trent Water Limited and Yorkshire Water Limited (the local water and sewerage undertakers). The purpose of this engagement has been to obtain relevant baseline information and to discuss the Proposed Scheme and potential effects. Engagement with these stakeholders will continue as part of the development of the Proposed Scheme.

15.1.3 Maps showing the location of the key environmental features (Map Series CT-10), and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2: LA09 Map Book. This map book also includes Map Series WR-01 and WR-02 showing surface water and groundwater baseline information respectively.

15.1.4 Volume 3: Route-wide effects, Water resources and flood risk (Section 16) covers the following at a route-wide level:

- the risk to water resources associated with accidents or spillages from trains during operation of the Proposed Scheme;
- a summary of how the Proposed Scheme aims to demonstrate compliance with the statutory requirements of the Water Framework Directive (WFD); and
- route-wide flood risk issues related to alignment of the Proposed Scheme with the Sequential Test and Exception Test policies in the National Planning Policy Framework (NPPF)[142].

## 15.2 Scope, assumptions and limitations

15.2.1 The scope, assumptions and limitations for the water resources and flood risk assessment are set out in Volume 1, Section 8 and the Scope and Methodology Report (SMR)[143].

15.2.2 Unless indicated otherwise, the spatial scope of the assessment (the study area) is based upon the identification of surface water and groundwater features within 1km

[142] National Planning Policy Framework, DCLG, 2015
[143] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

of the centre line of the route of the Proposed Scheme, as described in Section 2.2 of this report.

15.2.3 This assessment is based on desk study information, including information provided to date by consultees and stakeholders, as well as surveys of accessible water features.

15.2.4 Where surveys have not been undertaken due to land access constraints, a precautionary approach has been adopted in the assessments of receptor value and impact magnitude.

15.2.5 Hydraulic analysis is currently being undertaken of watercourses and key structures within flood risk areas. This includes hydraulic modelling of Morton Brook (including Westwood Brook) and the River Rother, and breach analysis of the Morton colliery settlement ponds.

15.2.6 Groundwater levels have been inferred from the available Environment Agency groundwater level monitoring boreholes, historic borehole logs and topographic data, as well as from spring and watercourse locations.

15.2.7 Impacts on biological receptors such as aquatic fauna and flora are assessed in Section 7, Ecology and biodiversity.

15.2.8 The assessments in this working draft ES are based on professional judgement using the information that it currently available. A precautionary approach has been adopted with regard to assessing the potential for adverse impacts to occur. The surveys, analysis and modelling work currently in progress, and the results of the consultation process, will be used to refine the assessments reported in the formal ES.

## 15.3 Environmental baseline

### Existing baseline - Water resources and WFD

#### *Surface water*

15.3.1 All surface water bodies in the study area fall within the Don and Rother or the Derwent Derbyshire management catchments of the Humber river basin district (RBD).

15.3.2 The river basin management plan[144] identifies the chemical[145] and ecological[146] status of surface water bodies, and the quantitative[147] and chemical[148] status of groundwater bodies within this RBD.

[144] Environment Agency (2015), *Water for life and livelihoods Part 1: Humber river basin district: River basin management plan*
[145] The chemical status of surface waters reflects concentrations of priority and hazardous substances present
[146] The ecological status of surface waters is determined based on the following elements:
- Biological elements – communities of plants and animals (for example, fish and rooted plants), assessed in Section 7, Ecology and biodiversity;
- Physico-chemical elements – reflects concentrations of pollutants such as metal or organic compounds, such as copper or zinc;
- Hydromorphological elements – reflects water flow, sediment composition and movement, continuity (in rivers) and the structure of physical habitats.

[147] The quantitative status of groundwaters reflects the presence or absence of saline or other intrusions, interactions with surface water, issues related to groundwater dependent terrestrial ecosystems (GWDTE) and overall water balance
[148] The chemical status of a groundwater body reflects effects on drinking water protected areas, its general quality, the importance of water quality within the water body for GWDTEs and surface water interactions and whether there are intrusions of poor quality groundwater present

15.3.3 To be compliant with WFD legislation, the Proposed Scheme should not cause deterioration of a water body from its current status; nor prevent future attainment of good status where this has not already been achieved. The Proposed Scheme should also avoid adverse impacts on protected or priority species and habitats.

15.3.4 Specialist field surveys are being undertaken, where access is available. Receptor values will be adjusted to reflect the outputs from these surveys, in close consultation with the Environment Agency. In the absence of field surveys, surface water bodies, other than minor ponds and ditches, have been identified within this assessment as being of either high or very high value on a precautionary basis.

15.3.5 Summary information relating to the surface water bodies potentially affected by the Proposed Scheme within the study area is provided in Table 24. The receptor value attributed to each individual water body is based on the methodologies set out in the SMR.

Table 24: Surface water body receptors

| **Water body name and location[149]** | **Designation** | **Q95 value ($m^3/s$) [150]** | **Receptor value** | **Parent WFD water body name and identification number[151]** | **Current WFD Status/Objective[152]** |
|---|---|---|---|---|---|
| Tributary of Morton Brook 1 – 350m south east of Alfreton Road<br><br>WR-01-360L1b C10 | Ordinary watercourse | <0.002 | Moderate | Westwood Brook catchment (tributary of Alfreton Brook)<br><br>GB104028052360 | Moderate/Moderate by 2015 |
| Tributary of Morton Brook 2 – from source at Newton<br><br>WR-01-360-L1b C10 | Ordinary watercourse | 0.01 | Moderate | | |
| Love Lane Drain 1<br><br>WR-01-360-L1b C9 | Minor ditch | n/a | Low | | |
| Tributary of Morton Brook 3 – 250m south-west of the land required for construction of the Proposed Scheme.<br><br>WR-01-360-L1b C8 | Ordinary watercourse | <0.002 | Low | | |
| Love Lane Drain 2<br><br>WR-01-360-L1b D8 | Minor ditch | n/a | Low | | |

[149] The feature locations are indicated by the grid coordinates on the relevant Volume 2: LA09 Map Book figure (in this case WR-01)
[150] This is the flow within the watercourse that is exceeded for 95% of the time
[151] The Environment Agency has attributed each surface water and groundwater body a unique water body identification (ID) number
[152] Status and objectives are based on those set out in the 2015 Environment Agency River basin management plan

| **Water body name and location**[149] | **Designation** | **Q95 value ($m^3/s$)** [150] | **Receptor value** | **Parent WFD water body name and identification number**[151] | **Current WFD Status/Objective**[152] |
|---|---|---|---|---|---|
| Love Lane Drain 3<br><br>WR-01-360-L1b D8 | Minor ditch | n/a | Low | | |
| Tributary of Morton Brook 4<br><br>WR-01-360-L1b D8 | Ordinary watercourse | <0.002 | Low | | |
| Westwood Brook – at Morton<br><br>WR-01-360-L1b D8 | Ordinary watercourse | 0.005 | Moderate | | |
| Tributary of Westwood Brook 1 – north-east of Morton<br><br>WR-01-360-L1b D8 | Ordinary watercourse | <0.002 | Low | | |
| Tributary of Westwood Brook 2 - Morton Colliery Settlement Lagoons<br><br>WR-01-360-L1b D8 | Ordinary watercourse | <0.002 | Low | | |
| Static water body (Pond)<br><br>WR-01-360-L1b F6 | Static water body | n/a | Low | Rother from source to Redleadmill Brook<br><br>GB104027052280 | Poor/Good by 2027 |
| Ain Moor Drain<br><br>WR-01-360-L1b F6 & F5 | Minor ditch | n/a | Low | | |
| Tributary of the River Rother 1 – at Padley Wood<br><br>WR-01-360-L1b F6 | Ordinary watercourse | <0.002 | Low | | |
| Tributary of the River Rother 2 – subsurface culvert<br><br>WR-01-360-L1b F6 | Ordinary watercourse | <0.002 | Low | | |
| River Rother – from Pilsley to Tupton via Clay Cross<br><br>WR-01-360-L1b G6 | Ordinary watercourse | 0.004 | High | | |
| Tributary of River Rother 3 - at | Ordinary watercourse | 0.003 | High | | |

| Water body name and location[149] | Designation | Q95 value ($m^3/s$) [150] | Receptor value | Parent WFD water body name and identification number[151] | Current WFD Status/Objective[152] |
|---|---|---|---|---|---|
| Danesmoor, south east of Clay Cross<br><br>WR-01-360-L1b G6 | | | | | |

### Abstractions and permitted discharges (surface water)

15.3.6 There are no licensed surface water abstractions in the study area.

15.3.7 Records of private unlicensed surface water abstractions, which comprise those for quantities less than $20m^3$ per day, have been obtained from the local authorities. These data indicate that there are no registered private unlicensed surface water abstractions within the study area. As there is no obligation to register private water supplies, unregistered private surface water supplies may be present. Private water supplies would be assessed as high value receptors unless details obtained from the owner indicate otherwise.

15.3.8 There are 12[153] consented discharges to surface waters within the study area, one of which is within the land required for construction of the Proposed Scheme. These have been assessed as being receptors of low value.

### *Groundwater*

15.3.9 The geology of the study area is described in Section 10, Land quality, and the superficial and bedrock hydrogeology is summarised in Table 25. Unless stated otherwise, the geological groups listed would all be crossed by the Proposed Scheme. Table 25 also identifies the receptor values attributed to each groundwater receptor based on the methodologies set out in the SMR.

[153] The number of consents listed here is different to the number listed in Section 10, Land quality. This is because the Water resources and flood risk default study area comprises all land within 1km of the centreline of the Proposed Scheme; the Land quality default study area extends 250m from the land required for the construction of the Proposed Scheme. These default study areas are extended where the potential for wider pathways exists.

Table 25: Summary of geology and hydrogeology in the study area

| Geology[154] | Distribution | Formation description | Aquifer classification | WFD body (ID) and current overall status[155] | WFD status objective[156] | Receptor value |
|---|---|---|---|---|---|---|
| **Superficial deposits** | | | | | | |
| Alluvium | Along watercourses within Tibshelf, Morton and Clay Cross | Clay, silt, sand and gravel | Secondary A | Not assessed by the Environment Agency | Not assessed by the Environment Agency | Moderate |
| **Bedrock** | | | | | | |
| Pennine Middle Coal Measures | In the central and eastern part of the Stonebroom to Clay Cross area, and from the southern extent of the route to the crossing of the River Rother | Interbedded marine and non-marine mudstone and sandstone (cyclothems), containing five coal seams and the Top Hard Rock. The bottom of the formation (and the top of the Lower Pennine Coal Measures) is marked by the Vanderbeckei Marine Band of fossiliferous mudstone. | Secondary A | Derwent Secondary Combined (GB40402G990400) Poor<br><br>and to the west, Don and Rother Millstone Grit and Coal Measures (GB40402G992300) Poor | Both good by 2027 | Moderate |
| Pennine Lower Coal Measures | In the north and western part of the Stonebroom to Clay Cross area, and from the crossing of the River Rother to Clay Cross | Comprising mudstone with clay ironstone bands. | Secondary A | Don and Rother Millstone Grit and Coal Measures (GB40402G992300) Poor | Good by 2027 | Moderate |

## Superficial deposit aquifers

15.3.10 The basis of the receptor values attributed to the superficial deposit aquifers present within the study area, as shown in Table 25, is outlined briefly as follows; alluvium has

[154] In recent years the British Geological Survey (BGS) has revised the nomenclature used to describe the geological materials present in Great Britain, with the publication of a series of lithostratigraphic framework reports. Some of these reports cover an entire geological period e.g. The Carboniferous and others cover a single group e.g. the Triassic Mercia Mudstone. The nomenclature used in these reports supersede the nomenclature introduced in the 1980s. While some traditional names have been retained by this process, many new names have also been generated, and many geological maps have not yet been updated. Some stratigraphic units have been renamed twice in the last 35 years. To reflect this, the previous name used for geological units (if different) is shown in brackets.
[155] These objectives are as stated in the 2015 Environment Agency River basin management plan.
[156] These objectives are as stated in the 2015 Environment Agency River basin management plan.

been classified as a Secondary A aquifer by the Environment Agency. These aquifers may be capable of supporting water supplies at a local rather than regional scale and may also form an important source of base flow to rivers. They have, therefore, been classified as a moderate value receptor.

### Bedrock aquifers

15.3.11 The basis of the receptor values attributed to the bedrock aquifers present within the study area, as shown in Table 25 is outlined briefly as follows; the Pennine Middle and Lower Coal Measures have been classified as Secondary A aquifers by the Environment Agency. These aquifers are capable of supporting water supplies at a local scale, and can provide an important component of base flow to rivers. They have, therefore, been classified as moderate value receptors.

### WFD status of groundwater bodies

15.3.12 A summary of locations, current overall WFD status, and future overall status objectives associated with the designated bedrock groundwater bodies within the study area is provided in Table 25. The value attributed to each of these receptors is also indicated.

15.3.13 The superficial deposits in the study area are not formally designated as WFD groundwater bodies but may be hydraulically connected to the WFD bedrock aquifers.

### Abstraction and permitted discharges (groundwater)

15.3.14 There are no groundwater abstractions licensed for public water supply in the study area. There are no source protection zones (SPZs) associated with licensed public water supplies within the study area.

15.3.15 There are no private groundwater abstraction licences registered in the study area.

15.3.16 Records of private unlicensed groundwater abstractions, which comprise those for quantities less than 20m$^3$ per day, have been obtained from the local authorities. These data indicate that there are no registered private unlicensed groundwater abstractions within the study area. As there is no obligation to register private water supplies, unregistered private groundwater supplies may also be present. Private water supplies have been assessed as high value receptors unless details obtained from the owner indicate otherwise.

15.3.17 There is no[153] consented discharge to groundwater within the study area.

### Groundwater - surface water interactions

15.3.18 Desk-based assessment using Ordnance Survey maps and detailed river network data provided by the Environment Agency identified seven features within the study area that had potential to be springs. Access was possible to inspect two of these features, of which:

- one, presumed to be located to the east of Stonebroom, could not be found or verified during the site visit and so has been assumed to be a high value receptor on a precautionary basis; and
- the other spring, located north-west of Mount Pleasant provides flow to

Morton Brook and has been assumed to be a moderate value receptor based on the WFD status of the receiving watercourse.

15.3.19 The remaining five potential spring features that have yet to be inspected are assumed to be high value receptors on a precautionary basis. None of these potential spring features are within the land required for the construction of the Proposed Scheme.

15.3.20 There are three ponds within the land required for construction of the Proposed Scheme. The nature and relative value of these features, the magnitude of the impacts that the Proposed Scheme would have on them, and the mitigation proposed, are outlined in Section 7, Ecology and biodiversity.

### *Water dependent habitats*

15.3.21 The following nature conservation site within the study area is potentially groundwater dependent. Padley Wood is an ancient woodland partly within the land required for the Proposed Scheme north-east of Padleywood Farm. This habitat is present within the area required for the Proposed Scheme, in the vicinity of Morton cutting. This feature has the potential to be partially groundwater fed and as such is classed as a groundwater dependent habitat for the purposes of this assessment. Further details of the ecology of this site, including the reporting on the effects and associated other mitigation, are provided in Section 7, Ecology and biodiversity.

15.3.22 No designated nature conservation sites within the study area which are dependent on surface water flows that have the potential to be affected by the Proposed Scheme.

## Existing baseline - flood risk and land drainage

15.3.23 The Environment Agency's Flood map for planning (rivers and sea)[157] has been used to scope the baseline flood risk for flooding from main rivers and ordinary watercourses. These plans define Flood Zone 2 (land assessed as having between a 1 in 100 (1%) and 1 in 1,000 (0.1%) annual probability of river flooding) and Flood Zone 3 (land assessed as having a 1 in 100 (1%) or greater annual probability of river flooding).

15.3.24 The updated Flood map for surface water[158] has been used to scope surface water flood risks. Infrastructure failure flood risks have been scoped using the Environment Agency risks of flooding from reservoirs national dataset[159]. The British Geological Survey (BGS) Groundwater flooding susceptibility data set[160], has been used to assess the future risk of groundwater flooding.

15.3.25 The following reports were used to help determine the baseline flood risk within the study area:

[157] Environment Agency (undated) *Flood map for planning.* Available online at: https://flood-map-for-planning.service.gov.uk/
[158] Environment Agency (2018), *Long term flood risk map for England*. Available online at https://flood-warning-information.service.gov.uk/long-term-flood-risk
[159] Environment Agency (2018), *Long term flood risk map for England*. Available online at: https://flood-warning-information.service.gov.uk/long-term-flood-risk/
[160] British Geological Survey (BGS) (2018) BGS groundwater flooding. Available online at: http://www.bgs.ac.uk/products/hydrogeology/groundwaterFlooding.html

- Chesterfield, Bolsover and North East Derbyshire Strategic Flood Risk Assessment (SFRA) (2009)[161];
- Derbyshire Local Flood Risk Management Strategy (LFRMS) (2015)[162]; and
- Derbyshire Preliminary Flood Risk Assessment (PFRA) (2011)[163].

### *River flooding*

15.3.26 The study area includes substantial areas of floodplain (Flood Zone 2 and 3) associated with Westwood Brook, Tributaries of Morton Brook and the River Rother. Table 26 shows all relevant watercourses within the study area with receptors that would potentially be affected by any changes in flood magnitude. The value of these receptors, based on the definitions in Table 57 of the SMR, is also indicated.

Table 26: River flood risk sources and receptors

| Source | Location description and figure/coordinate[164] | Receptor potentially affected | Receptor value/sensitivity to flooding |
|---|---|---|---|
| Morton Brook and, Westwood Brook | To the north-east and to the south of Morton.<br><br>WR-01-360-L1b D8 | Agricultural land | Moderate |
| | | Doe Hill Country Park (offline and online) ponds | Low |
| | | More than 20 residential properties on the Westwood Gardens cul-de-sac on the north side of Station Road at Morton | High |
| | | Station Road | Moderate |
| | | Erewash Valley Line | High |
| River Rother | South east of Clay Cross<br><br>WR-01-360-L1b F6 & G6 | Solar farm located west of Pilsley | Moderate |
| | | Padley Wood | Low |
| | | Access road in Danesmoor Industrial Estate | Moderate |
| | | Commercial property buildings located on the Danesmoor Industrial Estate. | Moderate |
| | | Chesterfield Community Care Farm off Pilsley Road | High |
| | | Residential property located off Pilsley Road | High |

[161] Chesterfield, Bolsover and North East Derbyshire District Councils Chesterfield. (March 2009) *Bolsover and North East Derbyshire Strategic Flood Risk Assessment* (SFRA) Faber Maunsell / AECOM
[162] Derbyshire County Council. (July 2015) *Derbyshire's Local Flood Risk Management Strategy. Local Flood Risk Management Strategy Parts 1 & 2*
[163] *Preliminary Flood Risk Assessment for Derbyshire*. (May 2011) Derbyshire County Council Environmental Services
[164] This is the location at which the source intersects the Proposed Scheme, as indicated by the grid coordinates on the relevant Volume 2: LA09 Map Book figure (in this case WR-01)

### *Surface water flooding*

15.3.27 There are a number of areas that are susceptible to surface water flooding within the study area. The key sources and receptors with potential to be affected are shown in Table 27. The value of these receptors, based on Table 57 of the SMR, is also indicated.

Table 27: Surface water flood risk sources and receptors

| Source | Location description and figure/coordinate[165] | Receptor potentially affected | Receptor value/sensitivity to flooding |
|---|---|---|---|
| Surface water flow path | Newton - at Alfreton Road<br>WR-01-360L1b- C10 | More than 10 residential properties in Newton | High |
| | | Residential properties and roads in Blackwell | High |
| | | Agricultural land | Moderate |
| | | Glove's Lane | Moderate |
| Surface water flow path | Tibshelf - at Alfreton Road<br>WR-01-360L1b- C10 | Residential properties on the Westwood Gardens cul-de-sac on the north side of Station Road at Morton | High |
| | | Agricultural land | Moderate |
| Surface water flow path | Doe Hill<br>WR-01-360L1b- D8 | Doe Hill Lane | Moderate |
| | | Agricultural land | Moderate |
| | | Love Lane | Moderate |

### *Artificial water bodies*

15.3.28 Flooding from artificial water bodies may occur due to failure of an impounding structure, such as a dam or canal embankment. Artificial water bodies with potential implications for flood risk within the study area include Morton Colliery settlement lagoons, which are perched above, and approximately 180m to the west of, the land required for the construction of the Proposed Scheme. The potential for these features to pose a flood risk has been recognised, and so a breach analysis will be undertaken to determine the area potentially inundated by floodwater. The results of this analysis will be reported within a flood risk assessment included in the formal ES.

### *Groundwater flooding*

15.3.29 Information related to historical incidents of groundwater flooding in the Stonebroom to Clay Cross area is described in the Chesterfield, Bolsover and NEDDC SFRA[161]. The SFRA states that there is no history of groundwater flooding within the study area.

15.3.30 The BGS Groundwater flooding susceptibility data set indicates that there is some potential for groundwater flooding to occur to the south of the route of the Proposed Scheme, south-west of Banks Farm, and in the central part of the area of the Proposed Scheme, east of Morton. These locations are associated with the presence of alluvium deposits along the watercourses in this area. The groundwater flooding map indicates a limited potential for groundwater flooding associated with the Top

[165] This is the location at which the source intersects the Proposed Scheme, as indicated by the grid coordinates on the relevant Volume 2: LA09 Map Book figure (in this case WR-01)

Hard Rock (sandstone bands belonging to the Pennine Middle Coal Measures) and where the route of the Proposed Scheme is underlain by the Pennine Lower Coal Measures.

### *Land drainage*

15.3.31 Existing topography, soils and land drainage systems within the study area are described in Section 4, Agriculture, forestry and soils. The rivers and watercourses within the area are connected to an extensive network of existing open drains. Subsurface drainage systems are also likely to be present in fields used for agriculture. The land drainage function of these systems, which is important for crop productivity, is potentially sensitive to increases in water levels within the receiving watercourses.

## 15.4 Effects arising during construction

### Avoidance and mitigation measures

15.4.1 The principal strategy adopted to limit the temporary and permanent effects of the Proposed Scheme is through avoidance of sensitive receptors wherever reasonably practicable. Where receptors could not be avoided, mitigation measures have been incorporated where appropriate and reasonably practicable, to limit the potential effects. Section 16 of the draft Code of Construction Practice (CoCP)[166] includes a range of mitigation measures that aim to reduce construction impacts as far as is reasonably practicable. The avoidance and mitigation measures that are of particular relevance to water resources and flood risk during construction are described in the following sections of this report.

### *Water resources and WFD*

15.4.2 The avoidance of sensitive receptors has reduced the risks associated with the Proposed Scheme not complying with the requirements of the WFD. Examples of this strategy include:

- avoidance of channels and floodplain areas, where reasonably practicable – the route of the Proposed Scheme will avoid passing along river or stream valleys, such as that of Westwood Brook, Morton Brook and the upper reaches of the River Rother and their associated floodplains by using the existing Erewash Valley Line infrastructure where reasonably practicable;
- avoidance, where reasonably practicable, of water dependent habitats, including natural springs that can play a key role in the hydrology and hydrogeology of such ecosystems; and
- avoidance, where reasonably practicable, of major public water supplies and smaller licensed and unlicensed abstractions of surface water and groundwater.

[166] Supporting document: Draft Code of Construction Practice

15.4.3 The presence of any unregistered private water supplies, their function and the means of protecting or if necessary replacing them would be discussed with any landowners potentially affected by the Proposed Scheme.

15.4.4 The temporary works shown on Map Series CT-05 in the Volume 2: LA09 Map Book have been informed by a detailed consideration of the water resources constraints and have sought to avoid sensitive features wherever reasonably practicable.

15.4.5 Watercourse realignments are proposed at the following locations: a tributary of Westwood Brook 1 at Morton Brook culvert, which requires a repositioning of the existing culvert under Pilsley Road at Morton; and a tributary of River Rother 1 at Morton cutting. The aim will be to design these with equivalent hydraulic capacity to the existing channels. The Proposed Scheme would also incorporate design measures that aim to ensure that field subsurface drainage systems can be adapted to discharge into the new channel. Where such watercourses are natural channels, the design aim will be to incorporate appropriate features to retain and, where reasonably practicable, enhance their hydromorphological condition[167].

15.4.6 Watercourse diversions, which would result in changes in flow regime within discrete sections of channel, have been avoided wherever possible. There is one diversion proposed within this study area. Instead of passing beneath the Erewash Valley Line underbridge, the River Rother watercourse would be diverted to the east side of the Proposed Scheme from a point directly upstream of the existing underbridge, south of the Danesmoor sewage works. The diverted watercourse would have a channel length of approximately 650m, and would re-join the River Rother 575m to the north. The existing channel on the west side of the route of the Proposed Scheme, and the culvert under the Erewash Valley railway in the vicinity of Danesmoor industrial estate, would be retained. This culvert conveys flows from tributaries of the River Rother 2 and 3 in addition to the treated effluent from the Danesmoor sewage treatment works.

15.4.7 For watercourses that are not in their natural condition, the design aim for realignments and diversions will be to incorporate measures, where reasonably practicable, to improve their hydromorphological condition, provided this is compatible with their flood risk and land drainage functions.

15.4.8 The design of infrastructure required within or in proximity to an existing channel (including bridge abutments, intermediate piers and outfalls) will aim to reduce impacts on the natural hydromorphology of watercourse channels, as far as is reasonably practicable.

15.4.9 The draft CoCP includes requirements to protect water bodies and their associated water resources from the potential impacts of pollution from construction site runoff, including where appropriate:

[167] "Hydromorphological condition" reflects the extent to which water flow, sediment composition and movement, continuity (in rivers) and the structure of physical habitats departs from that expected of a natural river or stream system.

- provision of maps showing sensitive areas and buffer zones where no pollutants are to be stored or used; and
- preparation of method statements for silt management, site drainage at compounds and satellite compounds, for the storage and control of oils and chemicals and the prevention of accidental spillages, in consultation with the Environment Agency, and if appropriate, the LLFA and other relevant authorities as part of the approvals process. These method statements will cover, where applicable:
  - the avoidance of discharges of site runoff to ditches, watercourses, drains, sewers or soakaways without the prior approval of the appropriate authority;
  - measures to prevent silt-laden runoff and other pollutants entering the water environment; and
  - restrictions or controls on excavation within watercourses to limit effects on water quality, sedimentation, fisheries and aquatic ecology.

15.4.10 Method statements will be required for all watercourse crossings and channel realignments required for site haul routes. The method statements will describe how potential changes to flood risk, water quality and channel hydromorphology will be managed during the establishment, use and decommissioning of all site haul routes.

15.4.11 Permanent culverts proposed on the smaller watercourse crossings within this study area include: Alfreton Road (east) culvert; Alfreton Road (west) culvert, Doe Hill culvert; Morton Brook culvert and a culvert under Pilsley Road. The detailed design of these culverts will be developed in general accordance with Construction Industry Research and Information Association (CIRIA) and Environment Agency guidance and in consultation with Environment Agency specialists. The design has sought to mitigate the impact on the hydromorphology of the affected watercourses, as follows:

- drop inlet culverts and inverted siphons have been avoided;
- culvert lengths have been reduced as far as is reasonably practicable; and
- invert levels will be set below the firm bed of the watercourse to allow a natural substrate to develop along the bed of the culvert.

15.4.12 The wider issues associated with these culverts, and how their detailed design will aim to ensure no deterioration in the status of any of the relevant water bodies WFD quality elements, will be considered within the formal ES.

15.4.13 Existing groundwater abstraction boreholes or monitoring points will be protected from physical damage, insofar as reasonably practicable, including appropriate decommissioning of abandoned boreholes in order to prevent pollution pathways. If boreholes are to be decommissioned and replaced with alternatives, the contractors will follow the latest good practices. This principle will also be applicable to springs potentially affected by the Proposed Scheme, although additional measures may be required to mitigate temporary construction impacts. Wherever reasonably practicable, the design will aim to recreate affected spring features nearby.

15.4.14 Measures will be introduced, as required, to mitigate the temporary and permanent effects on groundwater flows and water quality during excavation and construction of foundations, and cuttings as far as is reasonably practicable. The types of measure likely to be adopted could include:

- installation of cut-off[168] structures around excavations;
- ensuring cut-off structures are driven to sufficient depths to meet an underlying strata or zone of lower permeability;
- promoting groundwater recharge, such as discharging pumped water to recharge trenches around excavations to maintain baseline groundwater and surface water conditions; and
- incorporating passive bypasses within the design, which could comprise a 'blanket' of permeable material, such as gravel, placed around temporary structures allowing groundwater to bypass the below-ground works, without a rise in groundwater levels on the upstream side.

15.4.15 The exact requirements will be refined and method of mitigation will be designed following ground investigation at foundations or cutting locations.

### *Flood risk and land drainage*

15.4.16 The design of the Proposed Scheme will aim to mitigate permanent impacts on flood risk and land drainage as follows:

- the floodplain avoidance strategy will ensure that the impacts on flood flows within rivers and streams, and their floodplains, will be limited to those associated with widening the existing Erewash Valley Line railway embankments to accommodate construction of the Proposed Scheme. The Proposed Scheme includes a replacement floodplain storage area to replace the loss associated with the widened embankment.
- the temporary works shown on Map Series CT-05 in the Volume 2: LA09 Map Book have been informed by a detailed consideration of the flood risk constraints and have sought to avoid flood zones wherever reasonably practicable;
- provision has been made to pass surface water runoff and land drainage flows beneath sections of raised embankment that will cross surface water flow paths where reasonably practicable. This will be achieved using perimeter drainage and culverts, with their inverts set below the likely level of any upstream field subsurface drainage systems;
- in locations where the route of the Proposed Scheme will cross watercourses, the design aim is for structures to accommodate flood flows up to and including the 1 in 100 (1%) annual probability flood with an allowance for

[168] Impermeable barrier preventing water flow

climate change based on latest guidance issued by the Environment Agency[169];

- runoff from the footprint of the infrastructure could occur more rapidly post-construction due to steeper slope angles and the permeability of the newly-created surfaces. The design of drainage systems aims to ensure that there will be no significant increases in flood risk downstream, during storms up to and including the 1 in 100 (1%) annual probability design event, with an allowance for climate change based on the latest guidance issued by the Environment Agency;
- balancing ponds for new sections of highway and railway drainage have been sized on a precautionary basis, pending more detailed information about the permeability and runoff characteristics of existing and proposed ground surfaces;
- where the Proposed Scheme will pass in cutting, drainage measures will be provided with the aim of preventing flow into the cutting and diverting this water into its natural catchment. Where reasonably practicable, runoff from the cuttings will also be drained to the catchments to which this water would naturally drain, avoiding transfer of water from one water body to another, which could increase flood risk or impact on land drainage systems; and
- measures will be introduced to reduce any potentially significant effects on groundwater flood risk as far as is reasonably practicable, including the incorporation of passive hydraulic bypasses at cuttings and other below ground structures. These could for example comprise a 'blanket' of permeable material such as gravel.

15.4.17 The nominated undertaker will, insofar as reasonably practicable, ensure that flood risk is managed throughout the construction period and will consider flooding issues when planning sites and storing materials. If necessary, temporary provision will be made to reduce to the potential for impacts on existing land drainage systems during construction. Some of the specific measures referred to in the draft CoCP, include:

- preparation of flood risk assessments and method statements for temporary works, including main construction and satellite compound drainage, watercourse crossings and realignments and temporary realignments in consultation with the Environment Agency, and where applicable, the LLFA and other relevant regulators;
- location of storage, machinery, equipment and temporary buildings outside flood risk areas where reasonably practicable;
- construction of outfalls during periods of low flow to reduce the risk of scour and erosion;
- design of temporary watercourse realignments with equivalent hydraulic

[169] Environment Agency (2016) Adapting to Climate Change. Advice for Flood and Coastal Erosion Risk Management Authorities

capacity to the existing channels, ensuring that field subsurface drainage systems can be adapted to discharge into the new channel; and

- having regard to the requirement for construction activities to avoid any increases in flood risk to vulnerable receptors.

15.4.18 In accordance with the Section 16 of the draft CoCP, monitoring will also be undertaken in consultation with the Environment Agency and, where applicable, the LLFA, to ensure that temporary structures are installed, maintained and removed in accordance with the relevant environmental approvals and that impact on existing land drainage systems are managed appropriately.

## Assessment of impacts and effects

15.4.19 This section describes the significant effects following the implementation of the avoidance and mitigation measures. The majority of the potential temporary impacts on the water environment during construction will be avoided or mitigated by the working methods outlined in the draft CoCP. The mitigation embedded into the design has focused on reducing permanent impacts resulting from the presence of the Proposed Scheme to as low a level as is reasonably practicable.

### *Temporary effects – Water resources and WFD*

#### Surface water

15.4.20 Potential temporary impacts on surface water quality, due to site runoff and increased pollution risk, are a key concern during construction and have the potential to affect abstractions and the water environment more generally. However, the practices outlined in the draft CoCP are considered adequate to mitigate any impacts, such that there are unlikely to be any significant effects.

#### Groundwater

*Aquifers*

15.4.21 The proposed cuttings in the study area (Blackwell cutting, Stonebroom cutting and Morton cutting) would intersect the Pennine Middle Coal Measures Secondary A aquifer, the Pennine Lower Coal Measures Secondary A aquifer and the alluvium Secondary A aquifer. Whilst there are likely to be minor localised impacts, the implementation of the measures outlined in the draft CoCP is likely to mean that any impacts on the overall status of these aquifers would not be significant.

15.4.22 Implementation of the avoidance and mitigation measures set out in the draft CoCP would ensure that there are no permanent significant effects related to the impact of the proposed cuttings on water levels and quality in the aquifers intercepted by the Proposed Scheme.

15.4.23 Where cuttings could affect local receptors, such as groundwater abstractions or springs, this is reported in the sections below.

*Abstractions*

15.4.24 No groundwater abstractions have been identified within the study area.

*Groundwater - surface water interaction*

15.4.25 The assessment has not identified any temporary significant effects on groundwater - surface water interactions.

**Water dependent habitats**

15.4.26 Shallow groundwater may provide baseflow to Padley Wood. Earthworks have the potential to affect localised groundwater quality and flow, and the dewatering of Morton cutting could result in loss of groundwater feeding this feature, resulting in a minor hydrological impact at this location. The assessment of effects and associated other mitigation for water dependent habitats are provided in Section 7, Ecology and biodiversity.

### *Temporary effects - Flood risk and land drainage*

15.4.27 Construction of the culvert extensions at Morton Brook culvert and Doe Hill culvert would require temporary working within flood zones, as would the construction of Alfreton Road (west) and Alfreton Road (east) culverts and the diversion of the River Rother. Construction sequencing and temporary works design would be carefully considered and assessed in terms of potential impacts on flood risk. Method statements detailing how these works would be undertaken will be produced by the nominated undertaker in consultation with the Environment Agency and the LLFA. It is not anticipated that these temporary activities would result in significant effects related to flood risk and land drainage.

### *Permanent effects – Water resources and WFD*

15.4.28 Permanent effects are those initially caused by activity to construct the Proposed Scheme but which would also remain after the Proposed Scheme has been constructed and is present in the area.

**Surface water**

15.4.29 The assessment has not identified any localised impacts on surface water receptors that would give rise to permanent significant effects on surface water quality and channel hydromorphology in the Stonebroom to Clay Cross area.

**Groundwater**

*Aquifers*

15.4.30 It is currently anticipated that implementation of the avoidance and mitigation measures would ensure that there are no permanent significant effects related to the impact of the proposed cuttings on water levels and quality in the aquifers that would be intercepted by the Proposed Scheme.

15.4.31 Where the impacts of the cuttings on the aquifers could affect additional local receptors that rely on the groundwater resource, for example springs and abstractions, the impacts on these have been assessed below.

*Abstractions*

15.4.32 No groundwater abstractions have been identified within the study area.

*Groundwater - surface water interactions*

15.4.33 The assessment has not identified any temporary significant effects on groundwater - surface water interactions.

**Water dependent habitats**

15.4.34 Shallow groundwater flow may provide baseflow to Padley Wood. The permanent drainage associated with Morton cutting could result in loss of groundwater feeding this feature, resulting in a minor hydrological impact. The assessment of effects and associated other mitigation for water dependent habitats are provided in Section 7, Ecology and biodiversity.

### *Permanent effects - Flood risk and land drainage*

15.4.35 The earthworks required to construct the Proposed Scheme along the existing Erewash Valley Line would involve widening the footprint of the existing railway embankment within the floodplain of Westwood Brook at the Morton Brook culvert and the River Rother. The Proposed Scheme includes provision for a replacement floodplain storage area to mitigate the losses of flood storage. There are approximately 20 residential properties on the north side of Station Road, downstream of the Morton Brook culvert which are shown to be within Flood Zone 2. Until hydraulic modelling has been undertaken to verify the effectiveness of this proposed replacement floodplain storage area, the potential for a minor impact on these high value receptors cannot be discounted. This minor impact would result in a moderate adverse impact, which is significant.

## Other mitigation measures

15.4.36 Additional mitigation measures to further reduce the temporary and permanent impacts of construction stage activities, where there is potential for the Proposed Scheme to result in significant effects are described in the sections below.

### *Groundwater*

15.4.37 This assessment has not identified the requirement for any additional groundwater mitigation.

### *Flood risk and land drainage*

15.4.38 Detailed fluvial hydraulic analysis will be undertaken to more accurately determine the extent of the floodplain and quantify the change in flood level, if any, caused by the encroachment of the railway embankment into the floodplain of Westwood Brook at the Morton Brook culvert, and the River Rother. The results of this analysis will be used to design an appropriate replacement flood storage strategy to ensure that any significant localised flood risk effects are reduced insofar as reasonably practicable.

## Summary of likely residual significant effects

15.4.39 In the absence of the other mitigation measures set out above, the Proposed Scheme would potentially result in a moderate adverse effect related to flood risk to residential properties downstream of the Morton Brook culvert resulting from the proposed widening of the existing Erewash Valley Line embankment, which is significant.

15.4.40 It is currently anticipated that it should be possible to develop the means of mitigating these impacts, to ensure that there are no residual significant effects arising from construction of the Proposed Scheme.

## 15.5 Effects arising from operation

### Avoidance and mitigation measures

15.5.1 The principal issue of concern during operation of the Proposed Scheme is the potential for accidental spillages to occur that could result in the release of contaminants into the water environment. This issue has been assessed on a route-wide basis in Volume 3: Route-wide effects (Section 16), where the mitigation measures associated with this risk are described. A draft operation and maintenance plan for water resources and flood risk will be provided in the formal ES.

15.5.2 The design takes into account the policies in the NPPF and will aim to ensure that the Proposed Scheme is safe from flooding without increasing flood risk elsewhere. Evidence of application of the Sequential Test and Exception Tests in the NPPF is provided on a route-wide basis in Volume 3: Route-wide effects.

15.5.3 Sustainable drainage systems will be used where reasonably practicable. These will help to remove any suspended material within runoff from the Proposed Scheme through filtration, vegetative adsorption or settlement. The drainage systems proposed will aim to ensure that the quantity and quality of water draining from the Proposed Scheme during its operational phase will have a negligible impact on the water environment.

15.5.4 A summary of the route-wide WFD compliance assessment process is provided in Volume 3: Route-wide effects. This describes the ongoing assessment process and how measures will be embedded into the design that are specifically designed to ensure that the Proposed Scheme complies with the requirements of the WFD, where reasonably practicable. It is currently anticipated that the Proposed Scheme will be compliant with WFD legislation.

### Assessment of impacts and effects

15.5.5 There are considered to be no significant adverse effects related to water resources and flood risk arising from operation of the Proposed Scheme.

### Other mitigation measures

15.5.6 There are considered to be no further measures required to mitigate adverse effects on surface water resources, groundwater resources or flood risk.

### Summary of likely residual significant effects

15.5.7 The assessment shows that there would be no residual significant effects on surface water, groundwater or flood risk during operation of the Proposed Scheme.

## Monitoring

15.5.8 Volume 1, Section 9 sets out the general approach to monitoring of water resources and flood risk during operation of the Proposed Scheme.

15.5.9 There are no area-specific requirements for monitoring water resources and flood risk during operation of the Proposed Scheme.

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