HS2

October 2018

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

Working Draft Environmental Statement

Volume 2: Community Area report

LA08: Pinxton to Newton and Huthwaite

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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 in 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.

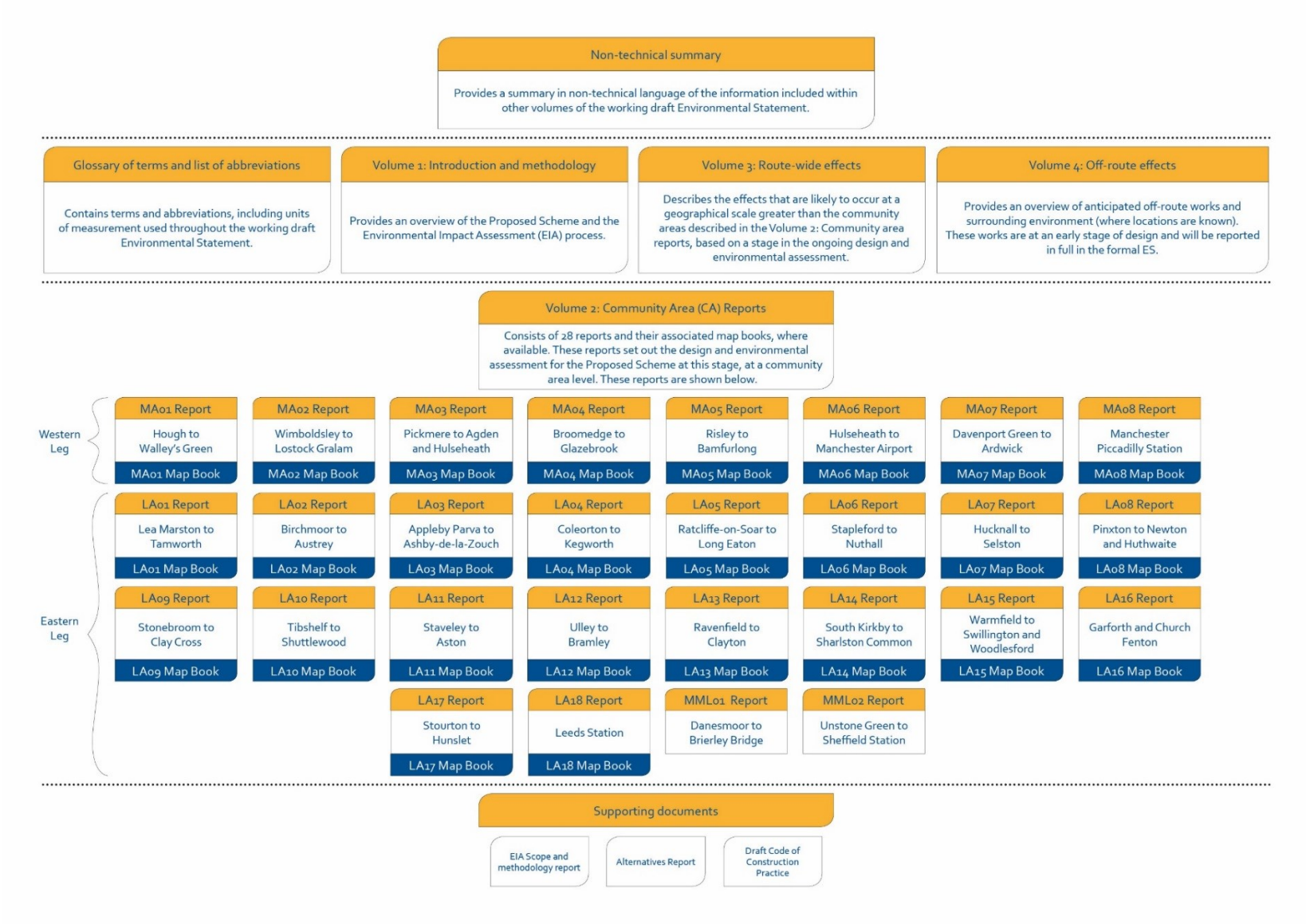
Volume 4: Off-route effects

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 pre-construction work on Phase One commenced in 2017.

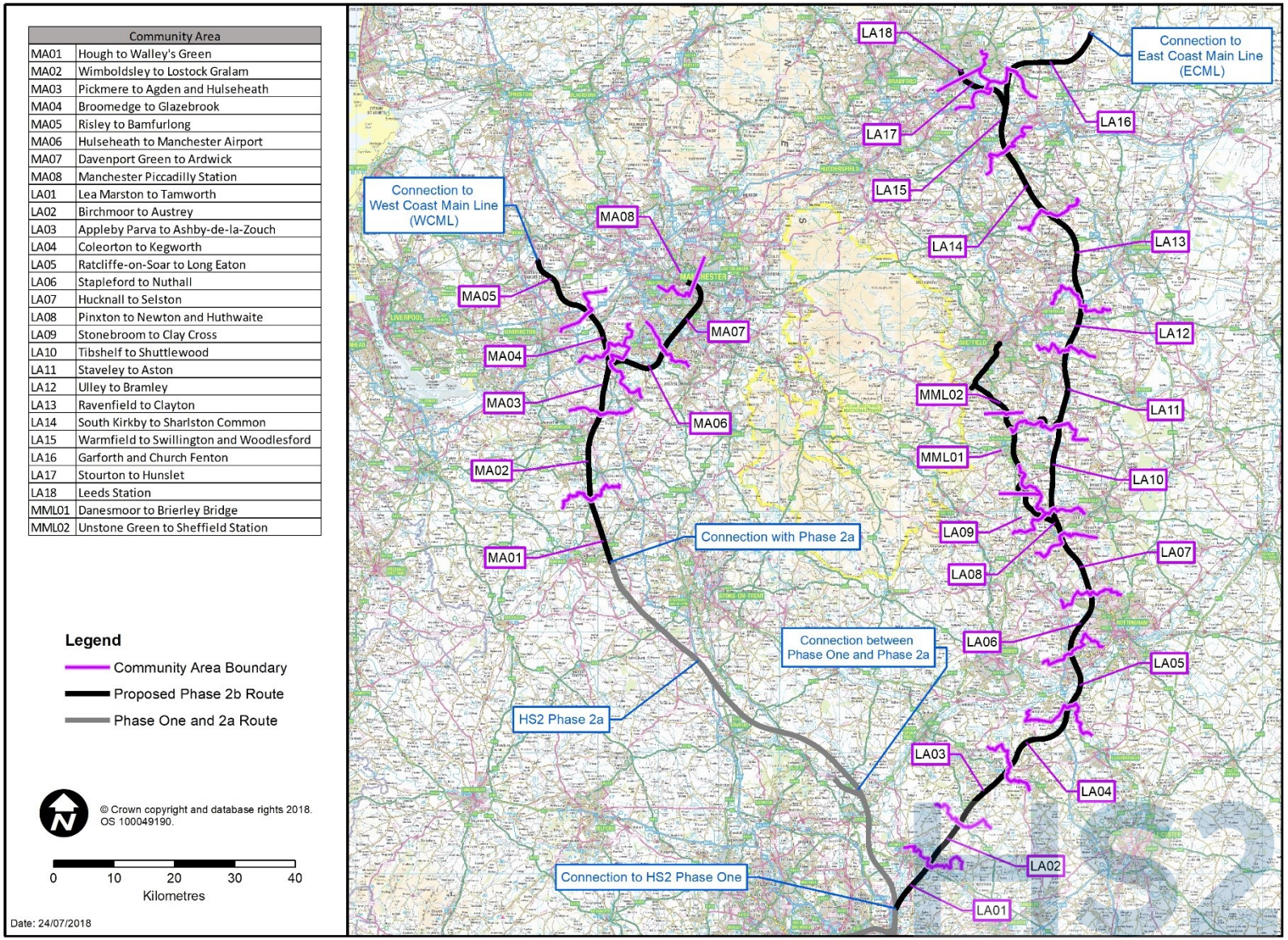
1.1.3 Phase Two of HS2 will extend the route from Phase One in the West Midlands to the north-west to Manchester (approximately 80km (50 miles) with connections to the West Coast Main Line (WCML) at Crewe and Golborne, and to the north-east to Leeds with a connection to the Erewash Valley Line and Midland 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 Pinxton to Newton and Huthwaite area (CA number LA08) which is located on the eastern leg of the Proposed Scheme.

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



1.2 Purpose and status of this report

1.2.1 This working draft ES sets out the preliminary environmental information and the key features of a point-in-time design for the Proposed Scheme. It provides a description of the design of the Proposed Scheme, environmental baseline information, and the likely impacts (and where practicable, the significant effects) of the construction and operation of the Proposed Scheme on the environment within the Pinxton to Newton and Huthwaite 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 The design development and environmental assessment process is ongoing. Consultation on the working draft ES is being carried out to assist 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 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 and biodiversity (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 (Sections 4 to 15) 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 Pinxton to Newton and Huthwaite area are provided in a separate corresponding document entitled Volume 2: LA08 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: LA08 Map Book). There is some flexibility during detailed design to alter the horizontal and vertical alignments and

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

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 Pinxton to Newton and Huthwaite area covers an approximately 7.7km section of the Proposed Scheme, comprising a 4.6km section of the HS2 main line and a 3.1km section of the Sheffield spur. The Proposed Scheme passes through the parishes of Pinxton, South Normanton, Blackwell and Sutton-in-Ashfield. The area falls within the local authority areas of Bolsover District Council (BDC) and Ashfield District Council (ADC) as well as Nottinghamshire County Council (NCC) and Derbyshire County Council (DCC). Pinxton parish and ADC forms the southern boundary of this area. The boundary between Blackwell and Tibshelf parishes forms the northern boundary of this area.

2.1.2 As shown in Figure 3, the Hucknall to Selston area (LA07) lies to the south, the Stonebroom to Clay Cross area (LA09) lies to the north-west, through which the Sheffield spur would continue, and the Tibshelf to Shuttlewood area (LA10) lies to the north, into which the HS2 main line would continue.

Settlement, land use and topography

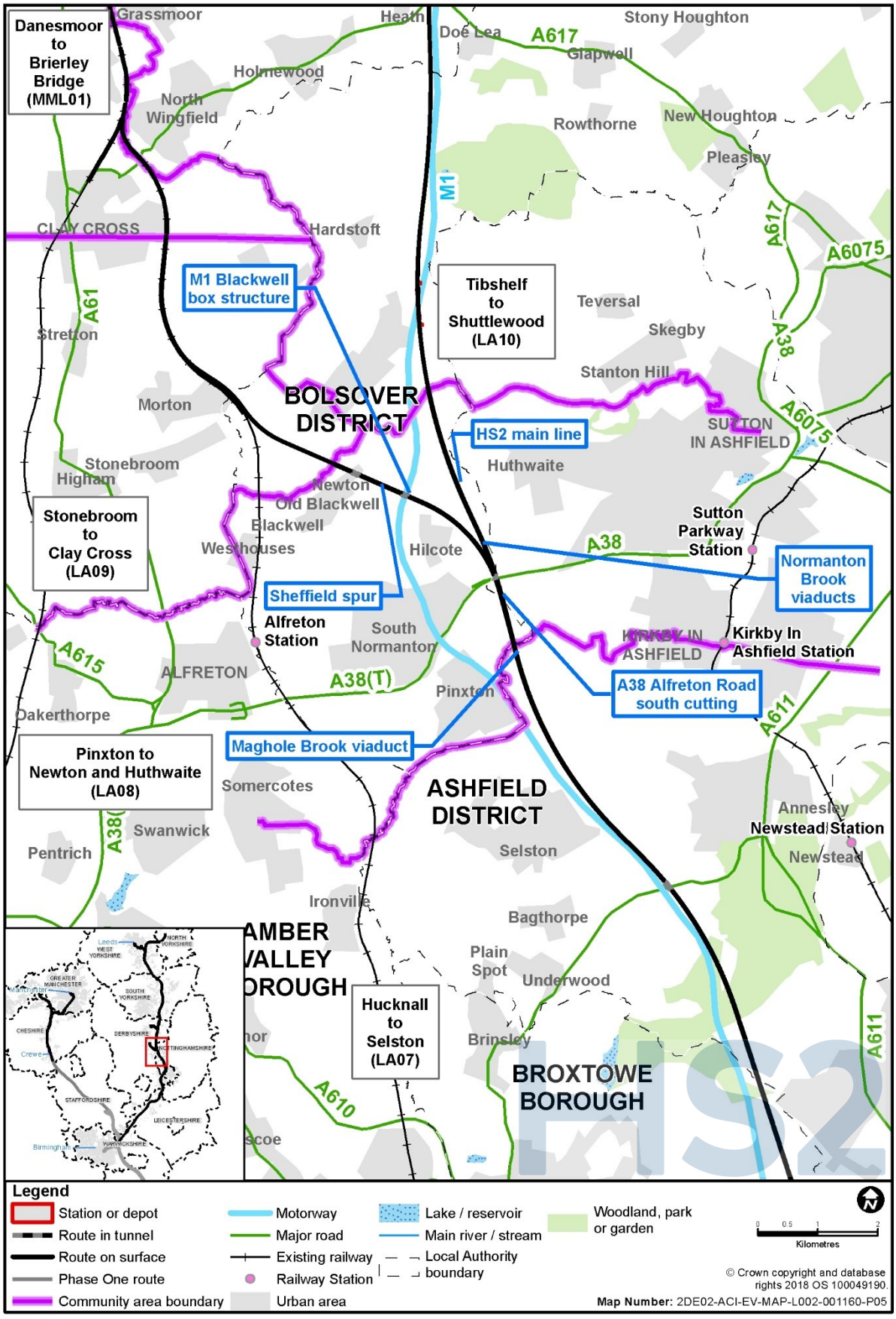
2.1.3 The Pinxton to Newton and Huthwaite area comprises a mix of rural and urban areas with agriculture, large commercial warehousing and industrial estates being the main land uses. The main settlements in the area include Pinxton, South Normanton, Sutton-in-Ashfield and Huthwaite. The area is also interspersed with villages and a scattering of isolated dwellings and farmsteads.

2.1.4 The urban fringe to the west of Huthwaite and to the east of Hilcote, surrounds a more rural corridor that runs up to the northern boundary of the Pinxton to Newton and Huthwaite area. Much of this landscape encompasses gently undulating lowland with woodland, hedgerows, grassland and former coal mining reclamation areas.

2.1.5 In the southern end of the Pinxton to Newton and Huthwaite area, there are a number of light industrial, commercial and retail facilities including Castlewood Business Park, the East Midlands Designer Outlet, Fulwood Industrial Estate and Langham Park Business Park. In the northern part of the area, the land use becomes progressively more agricultural with several isolated farmsteads.

2.1.6 At the southern end of the Pinxton to Newton and Huthwaite area, the Maghole Brook lies approximately 110m above Ordnance Datum (AOD). To the north, the undulating land rises to the A38 Alfreton Road at approximately 145m AOD, with the highest land at approximately 200m above Ordnance Datum (AOD) to the north-east of Newton.

Figure 3: Community area context map



Key transport infrastructure

2.1.7 The M1 passes through the Pinxton to Newton and Huthwaite area in a south-north orientation, with the Proposed Scheme predominantly located to the east of the motorway. The Sheffield spur would cross underneath the M1 north-west of Hilcote and east of Old Blackwell.

2.1.8 East of the M1 at junction 28, the A38 Alfreton Road connects Sutton-in-Ashfield and Mansfield with the M1. West of junction 28 with the M1 in the Pinxton to Newton and Huthwaite area, the A38 Trunk Road connects Alfreton with the M1.

2.1.9 Local roads in the Pinxton to Newton and Huthwaite area include the B6026 Huthwaite Lane, Newtonwood Lane, the B6406 New Lane, the B6026 Huthwaite Lane, the B6026 Cragg Lane and Alfreton Road.

2.1.10 West of the M1, the Erewash Valley Line runs through the Pinxton to Newton and Huthwaite area in a south-north orientation. There is a station at Alfreton, which is on the Erewash Valley Line.

2.1.11 Several public rights of way (PRoW) including local access roads, bridleways and public footpaths, provide important links between scattered dwellings and surrounding settlements. Within the Pinxton to Newton and Huthwaite area, there are also two designated traffic-free cycle routes, the Blackwell Trail and the Silverhill Trail (National Cycle Network (NCN) route 67).

Socio-economic profile

2.1.12 Within the BDC area, there is a wide variety of business types reflecting a diverse range of commercial activities. The construction sector accounts for the largest proportion of businesses (11.8%), with professional, scientific and technical the second largest (11.6%) followed by business administration and support services (10.5%).

2.1.13 According to the Annual Population Survey (2016)[4] the employment rate[5] within the Bolsover area was 75% (36,600 people) and unemployment[6] in the Bolsover area was 4%.

2.1.14 The Annual Population Survey (2016)[7] also reports that 22% of BDC residents aged 16-64 were qualified to National Vocational Qualification Level 4 (NVQ4) and above, while 8% of residents had no qualifications.

[4] Office for National Statistics (ONS) (2016) *Annual Population Survey*, NOMIS. Available online at: http://www.nomisweb.co.uk
[5] The proportion of working age (16-64 year olds) residents that is in employment.
[6] 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.
[7] Office for National Statistics (ONS) (2016) *Annual Population Survey*, NOMIS. Available online at: http://www.nomisweb.co.uk

Notable Community Facilities

2.1.15 The main concentrations of community facilities are located within the settlements of Pinxton and South Normanton. Hilcote, Huthwaite, Blackwell and Newton also contain local services.

2.1.16 Pinxton, located immediately west of the M1, provides a range of community resources, including two infant schools and a junior school, St. Helens Church, Town Street Methodist Church, Pinxton Community Youth Centre, John King Workshop Museum, a GP surgery, pharmacy, post office and a public house.

2.1.17 South Normanton has a range of community resources which include nursery, infant and secondary schools, St. Michael & All Angels Church, the Junction 28 Church and the Post Mill Centre, a community and corporate events venue. There are also numerous shops, public houses and restaurants.

2.1.18 Hilcote has a Methodist church, a care home, a shop which serves as a post office, general store and off-licence and public houses.

2.1.19 Huthwaite has local community resources which include All Saints Church and Centre, medical centre, post office, restaurants and public houses. Brierley Forest Golf Club and Forest Country Park, part of Greenwood Community Forest, are located to the north of the village.

2.1.20 Blackwell provides community resources which include a medical centre and pharmacy, care homes, a children's centre, a nursery, a primary school, Blackwell Methodist Church and Blackwell Miners' Welfare Social Club. Old Blackwell shares community resources with Blackwell.

2.1.21 Newton offers community resources including a primary school, a nursery, a post office, Newton Community Centre, Newton Methodist Church Fellowship, Sherwood Street Social Club and public houses.

Recreation, leisure and open space

2.1.22 In the Pinxton to Newton and Huthwaite area, there are a number of recreational open spaces such as sports grounds, allotments and playing fields. These can be found in Pinxton, South Normanton, Hilcote, Huthwaite, Blackwell and Newton and include Hamlet Lane Playing Fields, Woodend Farm Complex, Primrose Hill Playing Fields, Glove Lane Playing Field, South Street Recreation Ground, Newton Allotments and Brierley Forest Park, part of Greenwood Community Forest. The Hilcote Royal Oak Meadow and Woodlands, on the northern edge of Hilcote, is an area of open space being managed by the Hilcote Environmental Leisure Project (HELP).

2.1.23 The Proposed Scheme would cross several cycle routes including both the Silverhill Trail (NCN route 67) and the Blackwell Trail. The Silverhill Trail (NCN route 67), and linked Five Pits Trails, was developed on a former mineral railway and forms part of the Phoenix Greenways, a network of easy access off-road trails across Derbyshire and Nottinghamshire. Both trails can be used for walking, cycling and horse riding.

Policy and planning context

Planning framework

2.1.24 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.

2.1.25 The following local policies have been considered and are referred to where appropriate to the assessment:

- the Local Plan for Bolsover District (2018)[8];
- the adopted (saved) policies of the Ashfield Local Plan Review (2007)[9];
- the Derby and Derbyshire Minerals Local Plan (as amended 2000)[10];
- the Derby and Derbyshire Waste Local Plan (2005)[11] ;
- the Derbyshire Local Transport Plan (2011 – 2026)[12];
- the Nottinghamshire Minerals Local Plan (2005)[13];
- the Nottinghamshire and Nottingham Waste Local Plan (2002)[14] ;
- the Nottinghamshire and Nottingham Waste Core Strategy Part 1 (2013)[15];
- the Nottinghamshire Local Transport Plan (2011-2026)[16]; and
- the Selston Neighbourhood Plan (2017 – 2032)[17].

2.1.26 Emerging policies are not considered as part of this assessment unless a development plan has been submitted to the Secretary of State for examination. The Ashfield Local Plan Publication Draft was submitted to the Secretary of State for examination on

[8] Bolsover District Council (2018) *Bolsover District Plan*. Available online at: http://www.bolsover.gov.uk/images/LIVE/P/Plan_NLP_Publication_LPfBD_1805.pdf
[9] Ashfield District Council (2002) *Ashfield Local Plan Review*. Available online at: https://www.ashfield.gov.uk/residents/planning-and-building-control/forward-planning/local-plan-review-2002/
[10] Derbyshire County Council and Derby City Council (2000) *Derby and Derbyshire Minerals Local Plan. Final draft 2000.* Available online at: https://www.derbyshire.gov.uk/site-elements/documents/pdf/environment/planning/planning-policy/minerals-waste-development-framework/derby-and-derbyshire-minerals-local-plan-part-one.pdf and https://www.derbyshire.gov.uk/site-elements/documents/pdf/environment/planning/planning-policy/minerals-waste-development-framework/derby-and-derbyshire-minerals-local-plan-part-two.pdf
[11] Derby City Council and Derbyshire County Council (2005) *Derby and Derbyshire Waste Local Plan*. Available online at: https://www.derbyshire.gov.uk/site-elements/documents/pdf/environment/planning/planning-policy/minerals-waste-development-framework/derby-and-derbyshire-waste-local-plan.pdf
[12] Derbyshire County Council (2011) *Derbyshire Local Transport Plan (2011-2026).* Available online at: https://www.derbyshire.gov.uk/site-elements/documents/pdf/transport-roads/transport-plans/ltp3/derbyshire-local-transport-plan-three-ltp3-2011-to-2026-full-document.pdf
[13] Nottinghamshire County Council (2005). *Nottinghamshire Minerals Local Plan*. Available online at: http://www.nottinghamshire.gov.uk/media/110638/mineral-local-plan.pdf
[14] Nottinghamshire County Council (2002) *Nottinghamshire and Nottingham Waste Local Plan*. Available online at: http://www.nottinghamshire.gov.uk/media/109140/wastelocalplan.pdf
[15] Nottinghamshire County Council (2013) *Nottinghamshire and Nottingham Waste Core Strategy Part 1* http://www.nottinghamshire.gov.uk/media/109118/waste-core-strategy-1.pdf
[16] Nottinghamshire County Council (2011). *Nottinghamshire Local Transport Plan (2011-2026).* Available online at: http://www.nottinghamshire.gov.uk/media/123040/local-transport-plan-strategy.pdf
[17] Ashfield District Council (2017). *Selston Neighbourhood Plan (2017-2032).* Available online at: https://www.ashfield.gov.uk/media/3756/jus-t-np-referendum-version-sept.pdf

24th February 2017[18]. The Nottingham City Council Land and Planning - Local Plan Part 2 LAPP (2018) was submitted to the Secretary of State for examination on 23 April 2018[19].

Committed development

2.1.27 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.

2.1.28 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.

2.1.29 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.

2.1.30 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

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

- review of the proposed lengths and heights of viaducts and other river crossing structures and associated replacement floodplain storage areas;
- temporary and permanent utility diversions;
- refinement of the realignment of roads and PRoW crossing the Proposed Scheme;
- refinement of drainage features required for rail and highways;
- refinement of maintenance access routes, access to balancing ponds;
- additional, and refinement of, environmental features required to mitigate likely significant environmental effects;

[18] Ashfield District Council (2016). *Ashfield Local Plan Publication Draft*. Available online at: https://www.ashfield.gov.uk/media/2246/lp1-ashfield_publication_local_plan___2016.pdf
[19] Nottingham City Council (2017), *Land and Planning Policies – Local Plan Part 2 (Submission Version (2018).* Available online at: https://www.nottinghamcity.gov.uk/submission

- accommodation works and crossings of the route for private means of access;
- refinement of construction compound locations and site haul routes; and
- refinement of mid-point auto-transformer station location.

2.2 Description of the Proposed Scheme

2.2.1 The following section describes the main features of the Proposed Scheme in the Pinxton to Newton and Huthwaite 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 has two main components:

- the HS2 main line: the route of the Proposed Scheme, would continue from the northern boundary of the Hucknall to Selston area (LA07) towards the Tibshelf to Shuttlewood area (LA10); and
- the Sheffield spur: would diverge from the HS2 main line at South Normanton, heading in a north-west direction towards the Stonebroom to Clay Cross area (LA09).

2.2.4 The HS2 main line in the Pinxton to Newton and Huthwaite area would be approximately 4.6km in length, extending from Pinxton to Tibshelf. The Sheffield spur within the Pinxton to Newton and Huthwaite area would be approximately 3.1km in length, diverging from the HS2 main line at South Normanton and continuing to the north-west.

2.2.5 The Hs2 main line and Sheffield spur are illustrated in the Volume 2: LA08 Map Book, CT-06-448b to CT-06-602a.

2.2.6 Embankments and cuttings have been described according to their predominant physical characteristics. It is important to note that the depth of cutting or height of embankment may vary as a result of the topography through which the railway passes. In the Pinxton to Newton and Huthwaite area, the Brookhill Lane embankment includes a 150m section of cutting up to 3m below existing ground level. The Hilcote east embankment includes two 100m sections of cutting up to 4m below existing ground level and the Hilcote west embankment also include a short section of shallow cutting.

2.2.7 All dimensions in the sections below are approximate.

HS2 main line

2.2.8 In the Pinxton to Newton and Huthwaite area, the HS2 main line would be carried on the following features:

- viaducts for a total length of 310m (Maghole Brook, continuing from the Hucknall to Selston area (LA07) and Normanton Brook east);
- cuttings for a total length of 1.4km (A38 Alfreton Road south, Cartwright Lane, and Tibshelf); and
- embankments for a total length of 2.9km (Brookhill Lane, Normanton Brook east and Hilcote east).

2.2.9 The HS2 main line is described in two separate sections below.

2.2.10 In general, features are described along the HS2 main line from south to north, and west to east as they cross the Proposed Scheme, as shown on Map Series CT-06 in the Volume 2: LA08 Map Book.

Maghole Brook viaduct to Normanton Brook east embankment

2.2.11 The HS2 main line would continue from the Hucknall to Selston area (LA07), north towards South Normanton and Tibshelf, on the Maghole Brook viaduct. This section would continue onto Brookhill Lane embankment before passing into the A38 Alfreton Road south cutting and the Cartwright Lane cutting.

2.2.12 This section of route is illustrated on maps CT-06-448b to CT-06-449 in the Volume 2: LA08 Map Book.

2.2.13 Key features of this 1.6km section would include:

- a section of Maghole Brook viaduct, 170m in length, and up to 18m in height above ground level (see Volume 2: Map CT-06-448b, A5 to C5);
- two balancing ponds: one west of the HS2 main line for highway drainage and one east of the HS2 main line for railway drainage. The ponds would have access from the realigned Brookhill Lane to allow for maintenance (see Volume 2: Map CT-06-448b, B4 to C7);
- realignment of Brookhill Lane, 180m south of its existing alignment to pass under Maghole Brook viaduct. The realignment would include a cutting up to 650m in length to the east of the Hs2 main line and 300m of low embankment to the west. It would have associated landscape earthworks and landscape mitigation planting on both sides to help integrate the realignment into the surrounding landscape (see Volume 2: Map CT-06-448b, C3 to F10);
- Brookhill Lane embankment, 739m in length and up to 10m in height. The embankment would have associated landscape mitigation planting on both sides to help integrate the HS2 main line into the surrounding landscape (see Volume 2: Map CT-06-448b, C3 to E9);
- Brookhill Lane culvert, a drop inlet culvert[20] to allow a minor unnamed tributary 1 of the Maghole Brook to pass under the Brookhill Lane realignment

[20] A form of culvert used on sloping ground where the water level has to be lowered to pass under a railway or road.

(see Volume 2: Map CT-06-448b, C5);

- diversion of Sutton-in-Ashfield Bridleway 60, east of its current alignment, for 80m. The diversion would follow the south side of the Brookhill Lane realignment to where it meets Sutton-in-Ashfield Footpath 59, 200m west of Crow Trees Farm (see Volume 2: Map CT-06-448b, D8 to E8);
- diversion of Sutton-in-Ashfield Footpath 59 onto the realigned Sutton-in-Ashfield Bridleway 60 to the realigned Brookhill Lane The passage northwards from the realigned Brookhill Lane would be maintained as a new bridleway on the remnant of Sutton-in-Ashfield Footpath 59 (see Volume 2: Map CT-06-448b, E8);
- realignment of Pinxton Footpath B8/1/1, east of its current alignment for 500m. The realignment would be east of the HS2 main line to the south of Farmwell Lane (see Volume 2: Map CT-06-448b, D6 to F7);
- two balancing ponds for highway drainage west of the HS2 main line. They would have access from an access road off of Farmwell Lane to allow for maintenance (see Volume 2: Map CT-06-448b, E4 to E4);
- realignment of Farmwell Lane, on a lowered alignment, connecting with the Farmwell Lane underbridge under the HS2 main line (see Volume 2: Map CT-06-448b, F4 to F7);
- Farmwell Lane culvert, a drop inlet culvert to allow a minor unnamed tributary 2 of the Maghole Brook watercourse to pass under the Farmwell Lane realignment (see Volume 2: Map CT-06-448b, F5);
- Farmwell Lane underbridge, 37m in length, up to 6m below track level with a cutting to the east (see Volume 2: Map CT-06-448b, F5);
- Farmwell Lane retaining wall, 158m in length and up to 9m in height. The wall would be located south of the Farmwell Lane realignment to support a development area south of Farmwell Lane (see Volume 2: Map CT-06-448b, F6 to F7);
- Brookhilll Lane embankment culvert, to maintain an existing watercourse under the HS2 main line (see Volume 2: Map CT-06-448b, F5);
- a balancing pond for railway drainage, east of the HS2 main line, 50m north of the Farmwell Lane realignment. The pond would have access from the realigned Farmwell Lane to allow for maintenance (see Volume 2: Map CT-06-448b, F6 to G6);
- A38 Alfreton Road south cutting, 235m in length, up to 16m in depth and up to 160m in width. The cutting would have associated landscape earthworks and landscape mitigation planting on both sides to help integrate the HS2 main line into the surrounding landscape (see Volume 2: Map CT-06-448b, G5 to H6);
- an area of grassland habitat creation east of the HS2 main line, south of A38

Alfreton Road, to provide habitat replacement (see Volume 2: Map CT-06-448b, G6 to H7);

- McArthurGlen retaining wall, 62m in length and up to 6m in height. The wall would be west of the HS2 main line, to support the East Midlands Designer Outlet car park adjacent to the A38 Alfreton Road south cutting further north (see Volume 2: Map CT-06-448b, F5 to G5);
- A38 box structures under the A38, 60m in length, comprising one structure for both the northbound Sheffield spur and the HS2 main lines; and another to the east at a lower level for the Sheffield spur southbound line (see Volume 2: Map CT-06-448b, H5 to I5);
- Cartwright Lane cutting, 223m in length and up to 27m in depth to the east of the HS2 main line and up to 18m in depth to the west of the HS2 main line, for the southbound Sheffield spur line. The cutting would be up to 220m wide with associated landscape mitigation planting on the west side. There would also be landscape mitigation planting on the east side of the cutting at both the north and south ends. This mitigation planting would help integrate the HS2 main line into the surrounding landscape (see Volume 2: Map CT-06-448, H4 to J6 to Volume 2: Map CT-06-449, A4 to B6);
- Cartwright Lane pumping station, east of the HS2 main line. The pumping station would have access from Export Drive to allow for maintenance (see Volume 2: Map CT-06-448b, I5 to J7 to Volume 2: Map CT-06-A6 to B8);
- Cartwright Lane pumping station retaining wall, 247m in length and up to 7m in height. It would be east of the HS2 main line. It would be within the Cartwright Lane cutting to provide space for the Cartwright Lane pumping station (see Volume 2: Map CT-06-448b, I5 to I6);
- an area of grassland habitat creation, east of the HS2 main line, north of A38 Alfreton Road, to provide habitat replacement (see Volume 2: Map CT-06-448b, I6 to J7);
- thirty one ecological mitigation ponds east of the HS2 main line to provide new and replacement habitat for invertebrate species with surrounding terrestrial habitat. These would be within a wider area of grassland habitat creation to provide replacement habitat and ecological connectivity north of the A38 Alfreton Road (see Volume 2: Map CT-06-448b, H6 to J7);
- diversion of Sutton-in-Ashfield Footpath FP41, east of its current alignment for 420m. The diversion would be along the western boundary of the Fulwood Industrial Estate, north of the A38 Alfreton Road (see Volume 2: Map CT-06-448b, H5 to J7);
- Cartwright Lane dive under[21], 207m in length to allow the Sheffield spur

[21] A railway junction at which one or more diverging or converging tracks in a multiple-track route pass under a structure containing other tracks on the route to avoid conflicting train movements

northbound line to cross under the HS2 main line (see Volume 2: Map CT-06-448b, I5 to J5, to Volume 2: Map CT-06-449 B5 to C5);

- Cartwright Lane dive under south retaining wall, 223m in length and up to 10m in height located between the HS2 main line and Sheffield spur northbound line, within the Cartwright Lane dive under (see Volume 2: Map CT-06-448b, I5);
- Cartwright Lane dive under north retaining wall, 155m in length and up to 10m in height. The dive under would be located between the HS2 main line and the Sheffield spur (see Volume 2: Map CT-06-449, C5); and
- a balancing pond for railway drainage east of the HS2 main line. The pond would have access from Export Drive to allow for maintenance (see Volume 2: Map CT-06-449, B6 to C7).

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

2.2.15 Construction of this section would be managed from the Maghole Brook satellite compound and Farmwell Lane main compound, which are described in Section 2.3, and shown on map CT-05-448b in the Volume 2: LA08 Map Book.

Normanton Brook east embankment to Tibshelf cutting

2.2.16 The HS2 main line would continue north on the Normanton Brook east embankment before passing onto the Normanton Brook east viaduct and Hilcote east embankment. The HS2 main line would then pass into the Tibshelf cutting and continue on this to the end of the Pinxton to Newton and Huthwaite area.

2.2.17 This section of the HS2 main line is illustrated on map Maps CT-06-449 and CT-06-450.

2.2.18 Key features of this 3km section would include:

- Normanton Brook east embankment, 251m in length and up to a height of 13m. The embankment would have associated landscape mitigation planting on the east side to help integrate the HS2 main line into the surrounding landscape (see Volume 2: Map CT-06-449, B6 to D6);
- an area of woodland habitat creation east of the HS2 main line, north of Export Drive to provide habitat replacement (see Volume 2: Map CT-06-449, C8 to D6);
- Normanton Brook east viaduct, 140m in length and up to 16m in height above ground level, to allow for the crossing of the HS2 main line over the Normanton Brook and the Blackwell Trail (see Volume 2: Map CT-06-449, D6 to E6);
- an area of wetland habitat creation, extending under the Normanton Brook

east viaduct and alongside the Blackwell Trail to provide replacement habitat (see Volume 2: Map CT-06-449, D3 to D6);

- a replacement floodplain storage area for Normanton Brook, to the east side of the HS2 main line (see Volume 2: Map Book, Map CT-06-449, D6);
- Hilcote east embankment, 1.9km in length and up to a height of 19m, with associated landscape earthworks, 250m of which would be to provide acoustic screening to Twinyards Farm and Huthwaite, and landscape mitigation planting on both sides of the embankment to help integrate the HS2 main line into the surrounding landscape (see Volume 2: Map CT-06-449 E5 to J6 to Volume 2: Map CT-06-450 A5 to F6);
- diversion of Blackwell Footpath B3/6/1, diverted south of its current alignment for 1.3km (to the west of the Sheffield spur) and onto the Blackwell Trail which crosses both the Sheffield spur and the HS2 main line. East of the HS2 main line the path would be diverted south from its current alignment along the western side of the County Estate (see Volume 2: Map Book, Map CT-06-449, D4 to F3);
- a balancing pond for railway drainage and a drainage pumping station west of the HS2 main line. The pond would have access via the access road from the existing B6026 Huthwaite Lane to allow for maintenance (see Volume 2: Map Book, Map Series CT-06-449, E5 to I5);
- Castlewood mid-point auto-transformer station west of the HS2 main line, between the Hilcote west embankment and Hilcote east embankment. Access to the mid-point auto-transformer station would be provided via the access road from the existing B6026 Huthwaite Lane (see Volume 2: Map CT-06-448, F4 to I5);
- Hilcote east embankment culvert 1, a drop inlet culvert to allow an unnamed tributary 1 of the Normanton Brook to pass under the HS2 main line (see Volume 2: Map CT-06-449, I5 to I6);
- Hilcote east embankment culvert 2, a drop inlet culvert to allow an unnamed tributary 2 of the Normanton Brook to pass under the HS2 main line (see Volume 2: Map, CT-06-450, B5 to B6);
- two balancing ponds, one for highway drainage and one for railway drainage, east of the HS2 main line. They would have access from the existing and realigned B6026 Huthwaite Lane to allow for maintenance (see Volume 2: Map, CT-06-450, A7 to B6);
- realignment of B6026 Huthwaite Lane, 200m north of its existing alignment, to pass under the HS2 main line on the B6026 Huthwaite Lane underbridge (see Volume 2: Map CT-06-450, A1 to A7);
- B6026 Huthwaite Lane underbridge, 20m in length and up to 6m below track level to carry the HS2 main line over the realignment of the B6026 Huthwaite Lane (see Volume 2: Map CT-06-450, B5 to B6);

- Huthwaite Lane east access culvert and Huthwaite Lane culvert to allow an unnamed tributary 2 of the Normanton Brook to pass under the B6026 Huthwaite Lane realignment (see Volume 2: Map CT-06-450a, A7 to B7);
- diversion of the Sutton-in-Ashfield Bridleway 30, west of its current alignment for 30m. The diversion would be north of the B6026 Huthwaite Lane and west along the B6026 Huthwaite Lane realignment (see Volume 2: Map CT-06-450, A7 to B7);
- an area of grassland habitat creation east of the HS2 main line, north and south of the B6026 Huthwaite Lane realignment to provide habitat replacement (see Volume 2: Map CT-06-450, A6 to C6);
- diversion of Blackwell Footpath B3/36/2, south of its current alignment for 70m onto the B6026 Huthwaite Lane realignment (see Volume 2: Map CT-06-450, B5);
- Hilcote east embankment culvert 3, to allow an unnamed tributary 3 of the Normanton Brook to pass under the HS2 main line (see Volume 2: Map CT-06-450, C5 to C6);
- closure of Blackwell Footpath B3/10/5 west of the HS2 main line (see Volume 2: Map CT-06-450, D5 to D6);
- realignment of Blackwell Footpath B3/10/6 west of its current alignment for 310m. The realignment would pass around a balancing pond east of the HS2 main line (see Volume 2: Map CT-06-450, E5 to E6);
- a balancing pond east of the HS2 main line. The pond would have access from B6026 Huthwaite Lane to allow for maintenance (see Volume 2: Map CT-06-450, E6 to E7);
- Hilcote east embankment culvert 4, to allow an unnamed tributary 4 of the Normanton Brook to pass under the HS2 main line (see Volume 2: Map CT-06-450, E5 to E6);
- diversion of Blackwell Footpath B3/12/2, east of its current alignment and north along the east side of the HS2 main line. The realignment would join the Silverhill Trail (NCN route 67) 220m north of the Blackwell Footpath B3/12/2 diversion. A short section of this diversion would also be realigned around a balancing pond in the area east of the HS2 main line and south of the Silverhill Trail (NCN route 67) (see Volume 2: Map CT-06-450, E6 to F5);
- a section of Tibshelf cutting, 636m in length, up to 13m in depth and up to 135m in width. The cutting would have associated landscaped earthworks and landscape mitigation planting on both sides to help integrate the HS2 main line into the surrounding landscape (see Volume 2: Map CT-06-450, F5 to I6);
- a balancing pond west of the HS2 main line for the Silverhill Trail overbridge (see Volume 2: Map CT-06-450, F4 to F7);
- realignment of Blackwell Footpath B3/11/1, west of its current alignment for

20m. The realignment would be immediately south of the Silverhill Trail (NCN route 67) to pass around a balancing pond and reconnect with the realigned Blackwell Footpath B3/11/2 (see Volume 2: Map CT-06-450, F4 to F5);

- realignment of Blackwell Footpath B3/11/2, west of its current alignment for 30m. The realignment would be immediately south of the Silverhill Trail (NCN route 67) to pass around a balancing pond and reconnect with the realigned Blackwell Footpath B3/11/1 (see Volume 2: Map CT-06-450, F5 to G5);
- realignment of Silverhill Trail (NCN route 67), to allow the Silverhill Trail (NCN route 67) to cross the HS2 main line on the Silverhill Trail overbridge. This realignment would modify the vertical alignment only (see Volume 2: Map CT-06-450, F4 to G6);
- Silverhill Trail overbridge, 55m in length and up to 8m above track level to allow the Silverhill Trail (NCN route 67) to pass over the HS2 main line (see Volume 2: Map CT-06-450a, F5 to G6);
- closure of Blackwell Footpath B3/13/1 A new footpath connection would be provided from the Silverhill Trail (NCN route 67) to Blackwell Footpath B3/13/2 (see Volume 2: Map CT-06-450, G4 to G5);
- a balancing pond for highway drainage, west of the HS2 main line (see Volume 2: Map CT-06-450, H5);
- an access track realignment to Newtonwood Lodge Farm east of the Hs2 main line with access from the realigned Newtonwoood Lane (see Volume 2: Map CT-06-450, H6 to I7);
- realignment of Newtonwood Lane, 50m south of its existing alignment for 400m to pass over the HS2 main line on the Newtonwood Lane overbridge (see Volume 2: Map CT-06-450, H4 to I7);
- diversion of Tibshelf Footpath B13/46/1, west of its current alignment for 320m. The diversion would join the realigned Newtonwood Lane 110m west of the HS2 main line (see Volume 2: Map CT-06-450, H5 to I5); and
- Newtonwood Lane overbridge, 86m in length, up to 8m above track level, 35m to the south of the existing road to carry the Newtonwood Lane road realignment over the HS2 main line (see Volume 2: Map CT-06-450, H5 to I6).

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

2.2.20 Construction of this section would be managed from the Farmwell Lane main compound, Huthwaite Lane satellite compound and the Newtonwood Lane satellite compound, which are described in Section 2.3, and shown on map CT-05-448b map CT-05-449 and map CT-05-450 in the Volume 2: LA08 Map Book.

Sheffield spur

2.2.21 The Sheffield spur would diverge from the HS2 main line at South Normanton and continue to the north-west before continuing into the Stonebroom to Clay Cross area (LA09).

2.2.22 The Sheffield spur would be carried on the following features:

- viaducts for a total length of 60m (Normanton Brook west and central viaducts which would run in parallel);
- cuttings for a total length of 1.8km (Hilcote, Newton east and Newton west cuttings); and
- embankments for a total length of 1.2km (Normanton Brook west, Hilcote west and Newton embankment).

2.2.23 In general, features are described along the Sheffield spur from south to north, and west to east as they cross the Proposed Scheme, as shown on Map Series CT-06 in the Volume 2: LA08 Map Book.

2.2.24 The Sheffield spur would diverge from the HS2 main line north-west on the Normanton Brook west embankment. It would continue on the Normanton Brook west and central viaducts and the Hilcote west embankment. The Sheffield spur would then pass into the Hilcote cutting, Newton east cutting, Newton west cutting and then the Newton embankment continuing to the end of the Pinxton to Newton and Huthwaite area.

2.2.25 The Sheffield spur is illustrated on Maps CT-06-449 to CT-06-602a.

2.2.26 Key features of this 3.1km section would include:

- Normanton Brook west embankment, 342m in length and up to a height of 12m. There would be associated landscape mitigation planting on the west side of the embankment to help integrate the Sheffield spur into the surrounding landscape. The northbound line on the Sheffield spur would be up to 5m lower than the southbound line of the Sheffield spur when it passes over this embankment (see Volume 2: Map CT-06-449, B5 to D5);
- Sheffield spur south retaining wall, 260m in length and up to 2m in height. The retaining wall would be located between the two Sheffield spur lines (see Volume 2: Map CT-06-449, C5 to D5);
- a balancing pond for railway drainage, west of the Sheffield spur. The pond would have access from B6406 Berristow Lane to allow for maintenance (see Volume 2: Map CT-06-449, C4 to D4);
- Normanton Brook west and central viaducts, 60m in length and up to heights of 16m and 11m above ground level respectively. The viaducts would carry the Sheffield spur lines over Normanton Brook and the Blackwell Trail (see Volume 2: Map CT-06-449, D5);
- Hilcote west embankment, 822m in length and up to a height of 13m. The

eastern northbound line is initially up to 5m lower than the southbound line over this embankment. The lines are at the same level by the end of the embankment. The embankment would have associated landscaped earthworks, to provide acoustic screening to residents of Hilcote and Twinyards Farm, and landscape mitigation planting on both sides to help integrate the Sheffield spur into the surrounding landscape (see Volume 2: Map CT-06-449, D4 to H1);

- a balancing pond for railway drainage, west of the Sheffield spur. The balancing pond would have access from Pasture Lane to allow for maintenance (see Volume 2: Map CT-06-449, E3 to F2);
- realignment of B6406 New Lane, 40m south-east of its existing alignment, to pass under the Hilcote west embankment (see Volume 2: Map CT-06-601 C4 to E9);
- B6406 New Lane underbridge, 21m in length, up to 6m below track level, to carry the realigned B6406 New Lane under the Sheffield spur (see Volume 2: Map CT-06-601, C6 to C7);
- two balancing ponds, one for highway drainage with a pumping station and a second for railway drainage, both south of the Sheffield spur. They would have access from B6406 New Lane and Pasture Lane to allow for maintenance (see Volume 2: Map CT-06-601, C5 to C6);
- two balancing ponds for land drainage, on the north side of the Sheffield spur. One would have road access from the existing B6406 New Lane to allow for maintenance (see Volume 2: Map CT-06-601, B7 to D7);
- Hilcote cutting, 500m in length, up to 6m in depth and up to 80m in width, with landscape earthworks on the west side and landscape mitigation planting on both sides of the cutting to help integrate the Sheffield spur into the surrounding landscape (see Volume 2: Map CT-06-601, C6 to F7);
- closure of Blackwell Footpath B3/8/1. An alternative route would be available along the realigned B6406 New Lane (see Volume 2: Map CT-06-601, D5 to D7);
- a balancing pond south of the Sheffield spur (see Volume 2: Map CT-06-601, E6);
- a balancing pond for highway drainage and a drainage pumping station, north of the Sheffield spur. It would have road access from B6026 Huthwaite Lane to allow for maintenance (see Volume 2: Map CT-06-449-L1, G6 to H9 Volume 2: Map CT-06-601, E7 to E8);
- M1 Blackwell box structure under the M1, 62m in length, to carry the Sheffield spur under the M1 (see Volume 2: Map CT-06-601, F6);
- a new footpath along the west side of the M1. This footpath would cross over the route of the Sheffield spur on the M1 Blackwell box structure to maintain a pedestrian connection between B6026 Huthwaite Lane and Old Blackwell (see

Volume 2: Map CT-06-450, C5 to C6);

- Newton east cutting, 814m in length, up to 12m in depth and up to 125m in width. There would be landscape mitigation planting and landscape earthworks on both sides of the cutting, 400m of which would be to provide acoustic screening to residents in Newton and Old Blackwell and to help integrate the Sheffield spur into the surrounding landscape (see Volume 2: Map CT-06-601, F6 to J6);
- realignment of B6026 Huthwaite Lane north-west of its existing alignment, to provide connection to the B6026 Cragg Lane. To the south of the Sheffield spur, the B6026 Huthwaite Lane would be permanently closed in the village of Blackwell (see Volume 2: Map CT-06-601, F7 to H8);
- two balancing ponds for land drainage both sides of the Sheffield spur (see Volume 2: Map CT-06-601, F5 to F7);
- Old Blackwell retaining wall, 99m in length and up to 8m in height. The wall would be located south of the Sheffield spur, adjacent to the Old Farm Cottage Grade II listed building in Old Blackwell (see Volume 2: Map CT-06-601, G6);
- realignment of B6026 Cragg Lane east of its existing alignment, to pass over the Newton east cutting on the B6026 Cragg Lane overbridge. It would connect to the realigned B6026 Huthwaite Lane (see Volume 2: Map CT-06-601 G5 to G7);
- B6026 Cragg Lane overbridge, 62m in length and up to 8m above track level to carry the realigned B6026 Cragg Lane over the Sheffield spur (see Volume 2: Map CT-06-601, G6 to G7);
- a balancing pond for highway drainage north of the Sheffield spur (see Volume 2: Map CT-06-601, I6 and Volume 2: Map CT-06-601, H7 to I7);
- Alfreton Road retaining wall, 178m in length and up to 10m in height. The wall would support the north side of the cutting alongside the Newtonwood Fields residential development (see Volume 2: Map CT-06-601 I6 to J6);
- Alfreton Road box structure under Alfreton Road, 97m in length and built using embedded retaining walls (see Volume 2: Map CT-06-602a, B5 to B6);
- Newton west cutting, 327m in length, up to a depth of 12m and up to a width of 90m, with associated landscaped earthworks and landscape mitigation planting on both sides, 200m of which would be to provide acoustic screening to residents in Newton and Blackwell and to help integrate the Sheffield spur into the surrounding landscape (see Volume 2: Map CT-06-602a, C5 to D6);
- a balancing pond for railway drainage, south of the Sheffield spur. The balancing pond would have road access from South Street to allow for maintenance (see Volume 2: Map CT-06-602a, D4 to D5); and
- a section of Blackwell south embankment, 44m in length and up to 2m in height. The embankment would have landscape mitigation planting on both

sides to help integrate the Sheffield spur into the surrounding landscape (see Volume 2: Map CT-06-602a, D5 to D6).

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

2.2.28 Construction of this section would be managed from the Sheffield spur main compound, M1 south satellite compound and Alfreton Road satellite compound, which are described in Section 2.3, and shown on map CT-05-448, map CT-05-601 and CT-05-602a in the Volume 2: LA08 Map Book.

Demolitions

2.2.29 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.

2.2.30 At this stage of the design development, it is anticipated that demolition of 29 residential properties, four commercial/ business properties (including outbuildings) and five other structures would be required to construct the Proposed Scheme in the Pinxton to Newton and Huthwaite 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 Pinxton to Newton and Huthwaite area. The construction arrangements described in this section provide the basis for the assessment presented in this working draft 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[22] which sets out how HS2 Ltd and its contractors, as well as their sub-contractors, would undertake 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.

[22] 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

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; 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 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 Five civil engineering satellite compounds would be located in the Pinxton to Newton and Huthwaite area, none of which would continue to be used as railway installation satellite compounds following the completion of civil engineering works at those compounds. One railway systems satellite compound would be located in the Pinxton to Newton and Huthwaite area.

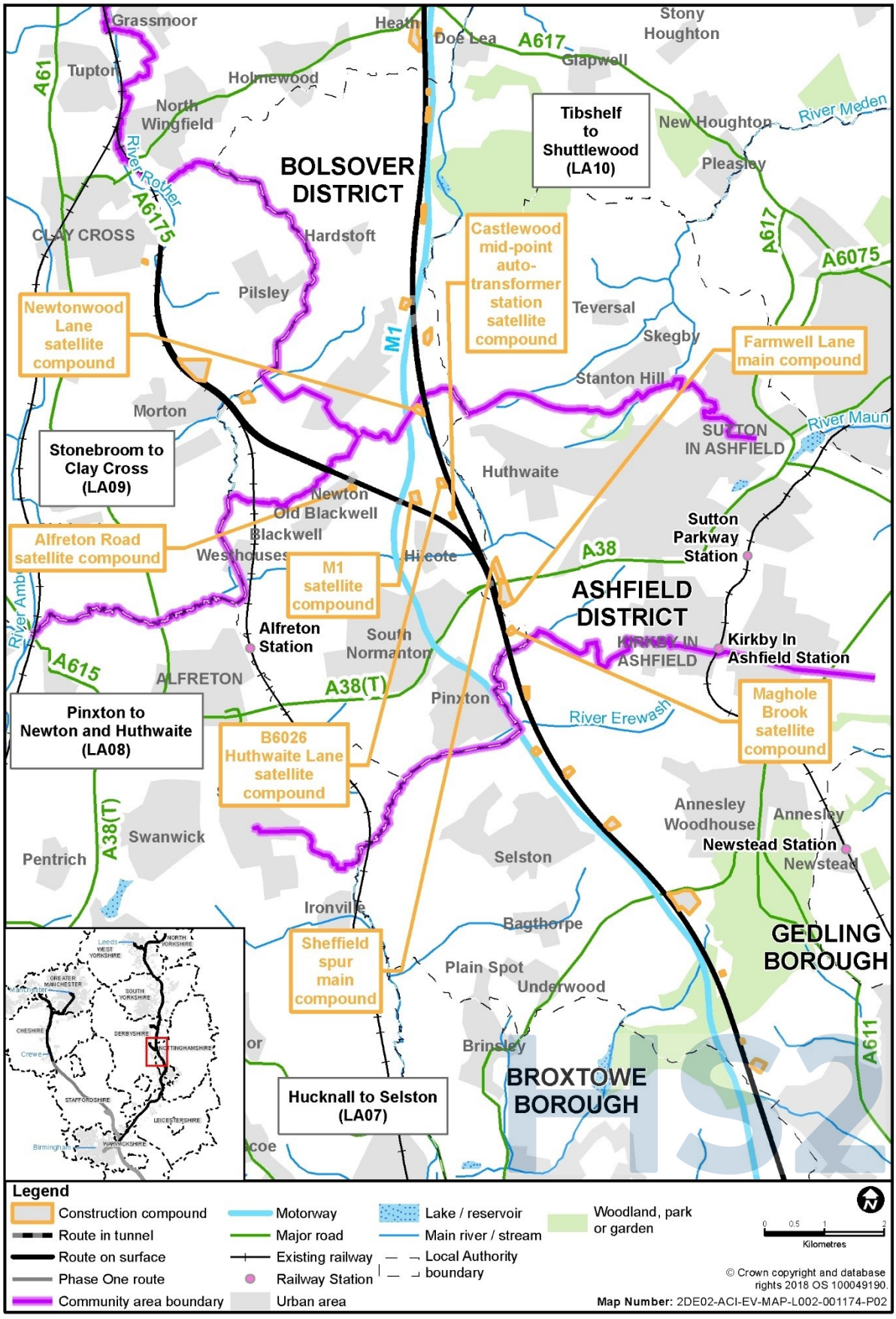
2.3.19 Two main civil engineering compounds, the Farmwell Lane main compound and the Sheffield spur main compound, would be located in the Pinxton to Newton and Huthwaite area. Works at five civil engineering satellite compounds and one railway systems satellite compounds in the Pinxton to Newton and Huthwaite area would be managed from these main compounds.

2.3.20 All satellite compounds for railway systems works would be managed from the Farmwell Lane main compound.

2.3.21 Civil engineering works at two satellite compounds and one railway system works satellite compound within the Stonebroom to Clay Cross area (see Volume 2: Community area report LA09: Stonebroom to Clay Cross) would be managed from the Sheffield spur main compound.

2.3.22 The location of construction compounds in the Pinxton to Newton and Huthwaite area is shown on Figure 4. Map Series CT-05 (in the Volume 2: LA08 Map Book) show in detail the locations of the construction compounds described below.

Figure 4: Location of construction compounds in the Pinxton to Newton and Huthwaite area



2.3.23 Figure 5 shows the management relationship for civil engineering works compounds and Figure 6 for the railway installation works. Details of the works associated with individual compounds are provided in subsequent sections of this report.

2.3.24 In the Pinxton to Newton and Huthwaite area there would be worker accommodation at Farmwell Lane main compound for the construction workforce. Details of the location and duration of worker accommodation are provided in the description of the compound.

2.3.25 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 top soil 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-05-449 to CT-05-601, in the Volume 2: LA08 Map Book.

2.3.26 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.

Construction traffic routes, site haul routes and transfer nodes

2.3.27 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.

2.3.28 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 Pinxton to Newton and Huthwaite area are described in the subsequent sections of this report.

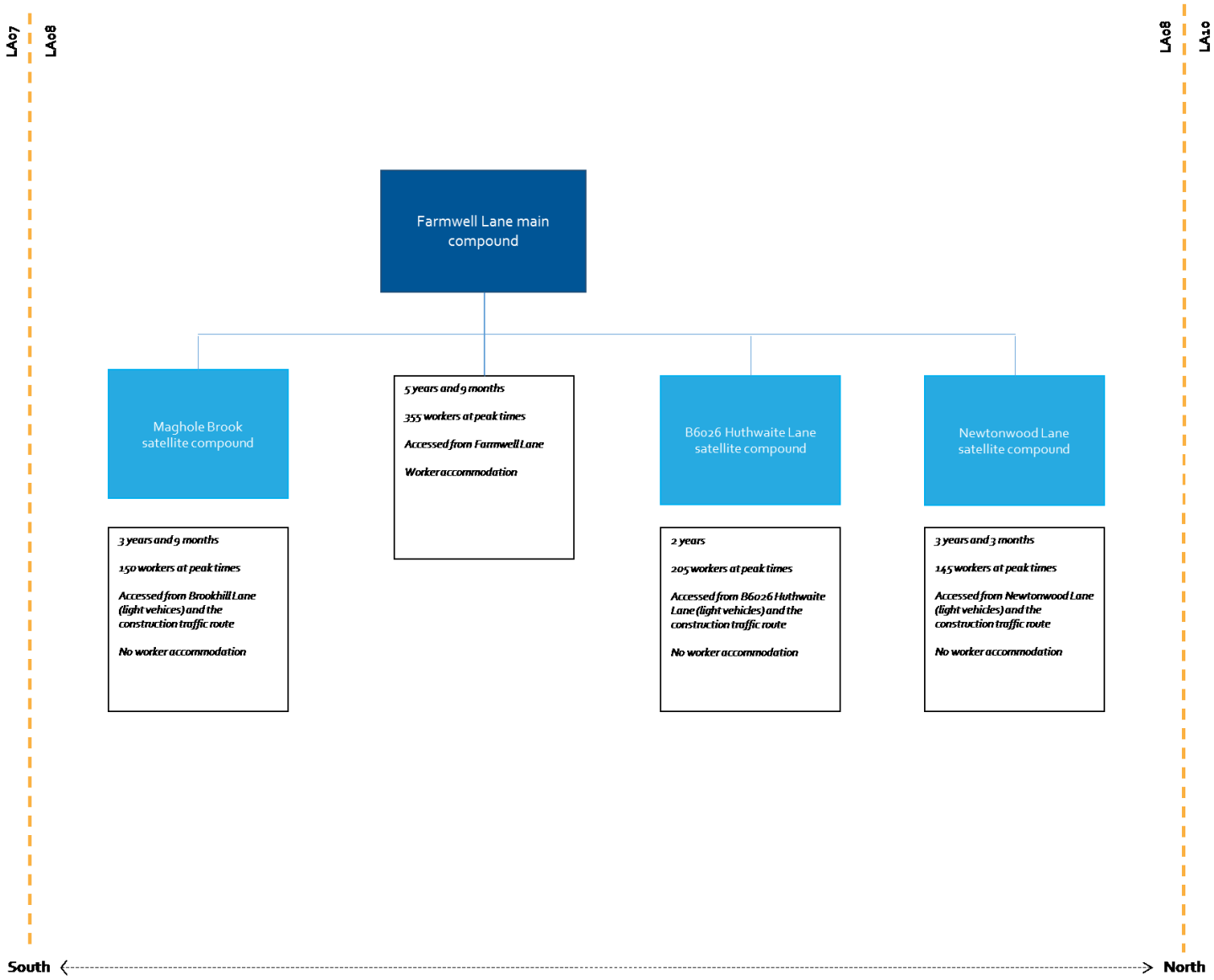
2.3.29 It may be necessary to undertake minor works including a number of minor highways and junction improvements along public roads that would be used as construction traffic routes but are at a distance from the route of Proposed Scheme. These minor works will be reported in the formal ES.

2.3.30 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 areas 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 Map CT-05-449 and Map CT-05-601 in the Volume 2: LA08 Map Book.

Construction compounds

2.3.31 This section provides a summary of the works to be managed from the construction compounds in the Pinxton to Newton and Huthwaite area, as illustrated in Figure 5 and Figure 6. 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 5: Construction compounds for civil engineering works



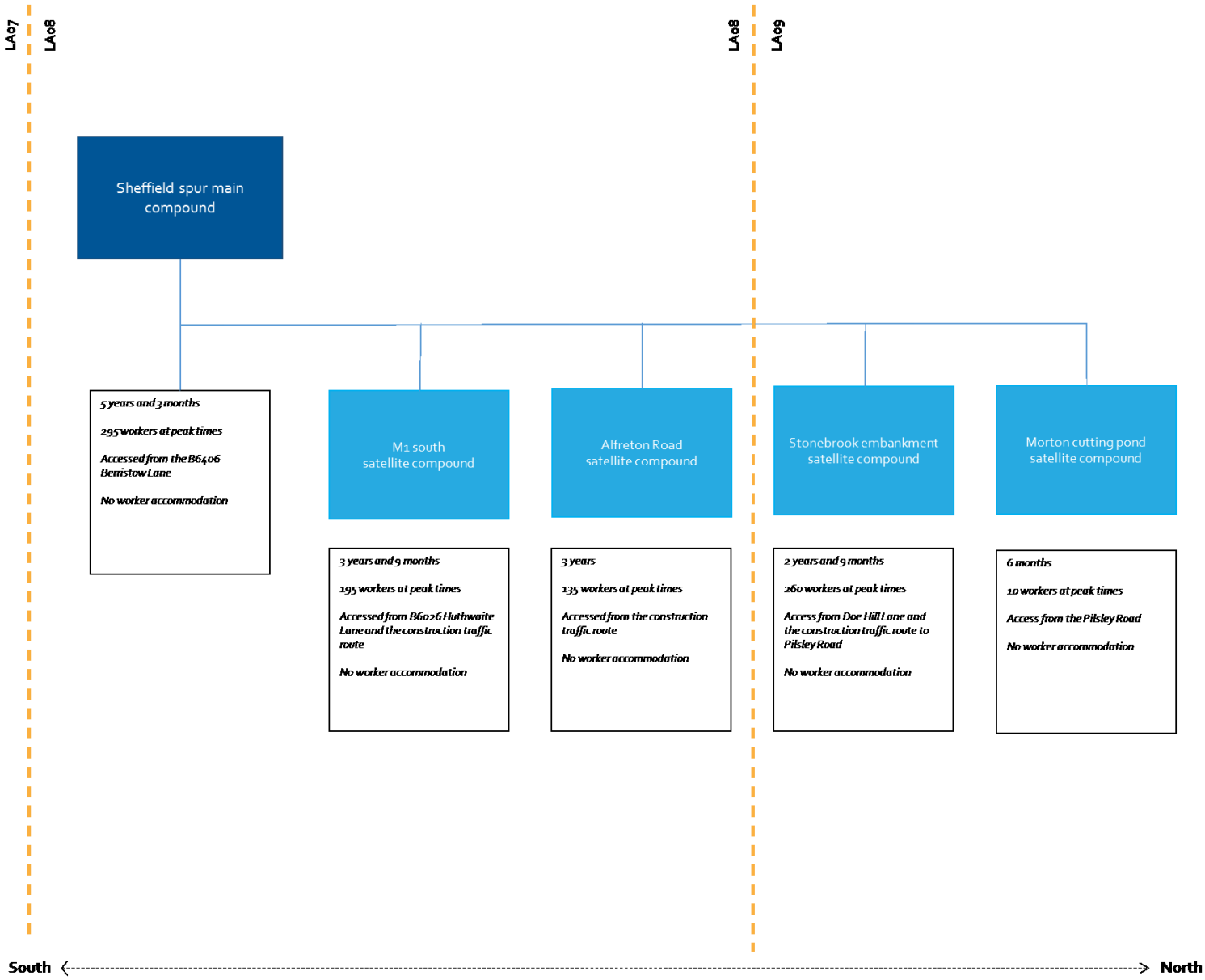
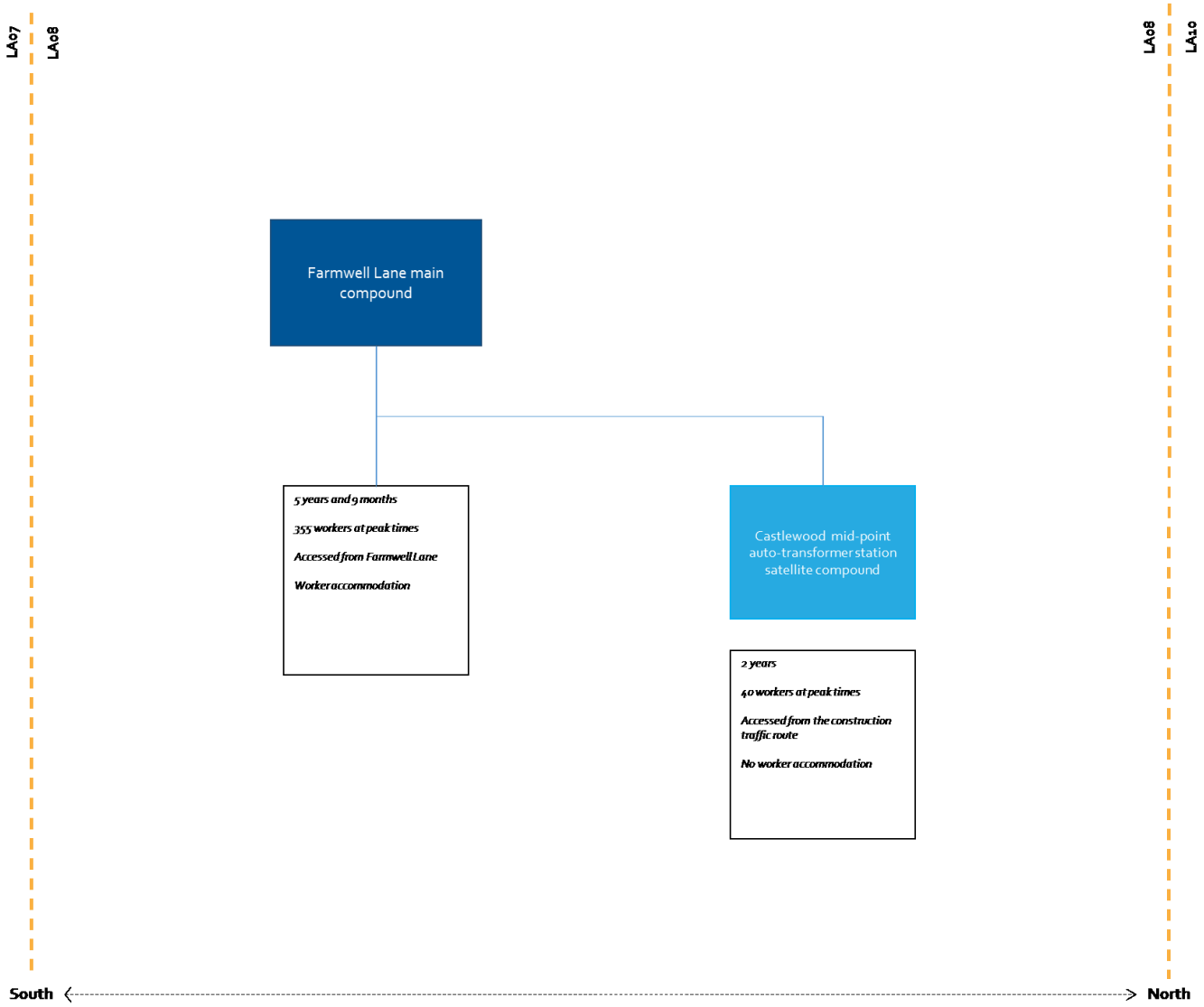
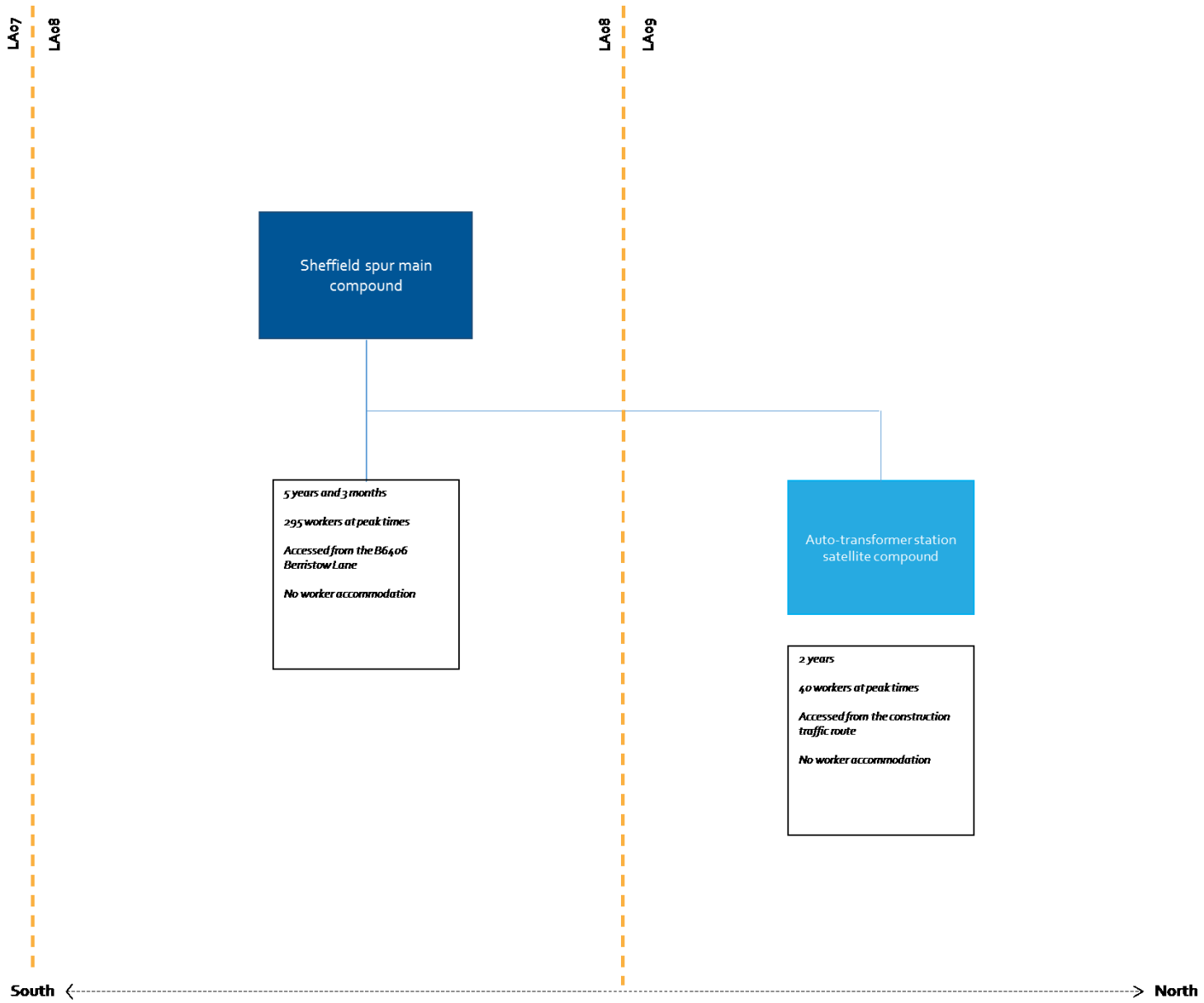

LA07
LA08
LA08
LA09
Sheffield spur main compound
5 years and 3 months
295 workers at peak times
Accessed from the B6406 Berristow Lane
No worker accommodation
M1 south satellite compound
3 years and 9 months
195 workers at peak times
Accessed from B6026 Huthwaite Lane and the construction traffic route
No worker accommodation
Alfreton Road satellite compound
3 years
135 workers at peak times
Accessed from the construction traffic route
No worker accommodation
Stonebrook embankment satellite compound
2 years and 9 months
260 workers at peak times
Access from Doe Hill Lane and the construction traffic route to Pilsley Road
No worker accommodation
Morton cutting pond satellite compound
6 months
10 workers at peak times
Access from the Pilsley Road
No worker accommodation
South
North

Figure 6: Construction compounds for railway systems works




LA07
LA08
LA08
LA09
Sheffield spur main compound
5 years and 3 months
295 workers at peak times
Accessed from the B6406 Bernstow Lane
No worker accommodation
Auto-transformer station satellite compound
2 years
40 workers at peak times
Accessed from the construction traffic route
No worker accommodation
South
North

Maghole Brook satellite compound

2.3.32 This compound (see Map CT-05-448b, D6 to D7) would be used to manage civil engineering works in the Pinxton to Newton and Huthwaite area, as illustrated in Figure 5. This compound would also be used to manage civil engineering works in the Hucknall area (see Volume 2: Community area report LA07, Hucknall to Selston).

2.3.33 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 Maghole Brook satellite compound

Description	Location	Feature resulting in the demolition
Residential		
Residential property and outbuildings	Brookhill Hall Farm, Brookhill Lane, Pinxton	Brookhill Lane embankment
Residential Property	Crow Trees Farm, Pinxton Lane, Pinxton	Brookhill Lane embankment
Commercial		
Commercial business at Crow Tress Farm	Pinxton Lane, Pinxton	Brookhill Lane embankment

2.3.34 The compound would be used to manage the construction of the Maghole Brook viaduct, which would take two years and 3 months to complete.

2.3.35 The compound would be used to manage the construction of Brookhill Lane embankment, which would take three years and nine months to complete. Material for the Brookhill Lane embankment would be received from cuttings elsewhere along the Proposed Scheme.

2.3.36 The works to public roads to be managed from this compound would be the permanent realignment of Brookhill Lane, south of its existing alignment to pass under the Proposed Scheme at the Maghole Brook viaduct. It would take 10 months to complete. The realignment would be built offline[23] and, on completion of construction, temporary local lane closures and traffic management measures would be implemented to enable connection of the realigned road to the existing road.

2.3.37 The works to be managed from this compound would require the temporary diversion of Sutton-in-Ashfield Footpath 59, for a period of three months, onto Sutton-in-Ashfield Bridleway 60. On completion of construction, Sutton-in-Ashfield Footpath 59 would be permanently diverted to the east at the point of the realigned Brookhill Lane.

2.3.38 A pre-cast yard and pre-cast laydown area[24] to manufacture and store concrete elements, such as viaduct beams, and facilitate the construction of the Maghole Brook

[23] Offline works are works which are generally constructed along or nearby existing routes, which will remain open during construction.
[24] an area to cast and store standardised reinforced concrete structural sections such as viaducts and bridge beams or piers for route of the Proposed Scheme and chainage specific structures. The concrete sections can then be transported along the trace for installation by crane at the associated structure.'

viaduct, would be located at this compound for a period of one year and eight months and would be accessed from the A608 Mansfield Road.

2.3.39 The compound would be used to manage the construction of the Brookhill Lane culvert which would take 6 months to complete.

2.3.40 There would also be utilities works managed from this compound.

Farmwell Lane main compound

2.3.41 This compound (see Map CT-05-448b, F6 to H7) would be used to manage civil engineering works and provide main compound support to three satellite compounds in the Pinxton to Newton and Huthwaite area, as illustrated in Figure 5, for a period of three years and nine months. On completion of the civil engineering works, the compound would remain and manage railway systems installation works for a period of six months.

2.3.42 The works to be managed from this compound would require demolition of the following buildings and structures, as described in Table 2.

Table 2: Demolitions required as a result of the works to be managed from the Farmwell Lane main compound

Description	Location	Feature resulting in the demolition
Residential		
Two residential properties and outbuildings on Berristow Place	Berristow Place, South Normanton	Cartwright Lane cutting
Residential Property	Longside Cottage Farm, Blackwell Road, South Normanton	Hilcote east embankment
Commercial		
Commercial business at Longside Cottage Farm	Blackwell Road, South Normanton	Hilcote east embankment
Other		
Compressor station	A38 Alfreton Road, South Normanton	Cartwright Lane cutting
Shed	A38 Alfreton Road, South Normanton	Cartwright Lane cutting
Electricity sub station	Farmwell Lane, South Normanton	Cartwright Lane cutting

2.3.43 The compound would be used to manage the construction of the following bridges and viaducts:

- Farmwell Lane underbridge, which would take two years and nine months to complete; and
- Normanton Brook east viaduct, which would take one year and nine months to complete.

2.3.44 The compound would be used to manage the construction of the following earthworks:

- A38 Alfreton Road south cutting, which would take 1 year to complete;

- Cartwright Lane cutting, which would take two years and six months to complete;
- Cartwright Lane dive under, which would take two years and nine months to complete;
- Normanton Brook east embankment, which would take three years and six months to complete; and
- Hilcote east embankment, which would take three years and six months to complete.

2.3.45 The compound would be used to manage the construction of the A38 box structures, which would take three years to complete.

2.3.46 A pre-cast yard and pre-cast laydown area to manufacture and store concrete elements, such as viaduct beams to facilitate the construction of the Normanton Brook east viaduct, would be located at this compound for a period of one year and four months. The yard would be accessed from Farmwell Lane.

2.3.47 There would be one transfer node associated with Farmwell Lane main compound within the Pinxton to Newton and Huthwaite area. The transfer node would occupy land to the north of the A38 Alfreton Road, east of the Proposed Scheme. The transfer node would be operational from 2025 for five years and four months. Access to the site would be from Farmwell Lane, using the site haul route.

2.3.48 The works to public roads to be managed from this compound would be the permanent realignment of Farmwell Lane south of its existing alignment to align with the Farmwell underbridge. It would take two years and nine months to complete. The realignment would be built online and, on completion of construction, temporary local lane closures and traffic management measures would be implemented to enable connection of the realigned road to the existing road.

2.3.49 The works to be managed from this compound would require the following works to PRoW:

- temporary diversion of Pinxton Footpath B8/1/1, for a period of three years and six months, with users diverted to the west to allow the construction of the Brookhill Lane embankment and the vertical realignment of Farmwell Lane. On completion of construction, Pinxton Footpath B8/1/1 would be permanently realigned to connect with the realigned Farmwell Lane;
- permanent diversion of the Sutton-in-Ashfield Footpath 41 to the east of its existing alignment to avoid the Cartwright Lane cutting;
- temporary local diversion of the Blackwell Trail, for a period of two weeks, between two of the viaduct piers on either of the adjacent spans for the construction of the Normanton Brook east viaduct; and
- permanent diversion of the Blackwell Footpath B3/6/1 south of its existing alignment west of the HS2 main line to connect with the Blackwell Trail.

2.3.50 The compound would be used to manage the construction of the following watercourse crossings:

- the Brookhill Lane embankment culvert which would take 9 months to complete; and
- the Farmwell Lane culvert which would take 9 months to complete.

2.3.51 There would also be utilities works managed from this compound.

Castlewood mid-point auto-transformer station satellite compound

2.3.52 This compound (see Map CT-05-449, G4) would be used to manage railway systems works in the Pinxton to Newton and Huthwaite area, as illustrated in Figure 6.

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

2.3.54 Key railway systems works to be managed from this compound would include construction and installation of the Castlewood mid-point auto-transformer station which would take 1 year and 6 months to complete.

2.3.55 Construction works for the Castlewood mid-point auto-transformer station would be accessed via the site haul route.

B6026 Huthwaite Lane satellite compound

2.3.56 This compound (see Map CT-05-448b, I4 to J5 and CT-05-450, A4 to B5) would be used to manage civil engineering works in the Pinxton to Newton and Huthwaite area, as illustrated in Figure 5.

2.3.57 The works to be managed from this compound would require demolition of the following buildings and structures, as described in Table 3.

Table 3: Demolitions to be managed from the B6026 Huthwaite Lane satellite compound

Description	Location	Feature resulting in the demolition
Residential		
Residential property and outbuildings	Yew Tree Farm, B6026 Huthwaite Lane, Blackwell	Hilcote east embankment

2.3.58 The compound would be used to manage the construction of the B6026 Huthwaite Lane underbridge, which would take one year to complete;

2.3.59 The works to public roads to be managed from this compound would be the permanent diversion of B6026 Huthwaite Lane north of its existing alignment to align with the B6026 Huthwaite Lane underbridge. It would take nine months to complete. The realignment would be built offline and on completion of construction, temporary local lane closures and traffic management measures would be implemented for three weeks to enable connection of the realigned road to the existing road.

2.3.60 The works to be managed from this compound would require the following works to PRoW:

- permanent diversion of Blackwell Footpath B3/36/2 for 50m to the south to tie in to the B6026 Huthwaite Lane underbridge and realignment of the B6026 Huthwaite Lane;
- temporary diversion of Blackwell Footpath B3/36/2, for a period of nine months, with users diverted north to the Sutton-in-Ashfield Bridleway 30 during the construction of the Hilcote East embankment. On completion of construction, Blackwell Footpath B3/36/2 would be permanently diverted south of its existing alignment to connect with the B6026 Huthwaite Lane realignment;
- closure of Blackwell Footpath B3/10/5; and
- temporary diversion of Sutton-in-Ashfield Bridleway 30, for a period of three months, with users diverted for the construction of the B6026 Huthwaite Lane realignment. On completion of construction, Sutton-in-Ashfield Bridleway 30 would be permanently diverted to the west of its existing alignment to connect with the B6026 Huthwaite Lane realignment.

2.3.61 The compound would be used to manage the construction of the following watercourse crossings:

- Hilcote east embankment culvert 1, which would take nine months to complete;
- Hilcote east embankment culvert 2, which would take nine months to complete;
- Huthwaite Lane east access culvert, which would take 1 year and 3 months to complete;
- Huthwaite Lane culvert, which would take 1 year and 3 months to complete;
- Hilcote east embankment culvert 3, which would take nine months to complete; and
- Hilcote east embankment culvert 4, which would take one year and six months to complete.

2.3.62 There would also be utilities works managed from this compound.

Newtonwood Lane satellite compound

2.3.63 This compound (see Map CT-05-448b, G4 to H5) would be used to manage civil engineering works in the Pinxton to Newton and Huthwaite area, as illustrated in Figure 5.

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

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

- Silverhill Trail overbridge, which would take one year and three months to complete; and

- Newtonwood Lane overbridge, which would take one year and nine months to complete.

2.3.66 The compound would be used to manage the construction of the Tibshelf cutting, which would take three years and six months to complete.

2.3.67 The works to public roads to be managed from this compound would be the permanent diversion of Newtonwood Lane north of its existing alignment to align with the Newtonwood Lane underbridge. It would take one year and five months to complete. The realignment would be built offline and on completion of construction, temporary local lane closures and traffic management measures would be implemented for three weeks to enable connection of the realigned road to the existing road.

2.3.68 The works to be managed from this compound would require the following works to PRoW:

- a new footpath connection from Blackwell Footpath B3/11/2 to the Blackwell Trail;
- temporary diversion of Silverhill Trail (NCN route 67), for a period of one year, with users diverted to the south along Blackwell Footpath B3/10/5 and B3/12/2. On completion of construction, the Silverhill Trail (NCN route 67) would be permanently realigned vertically to pass over the Silverhill Trail overbridge;
- temporary diversion of Blackwell Footpath B3/11/2, for a period of one year, with users diverted west along the new footpath connection. On completion of construction, Blackwell Footpath would be permanently diverted west of its exiting alignment to pass around a proposed balancing pond;
- permanent realignment of Blackwell Footpath B3/10/6, south of its existing alignment to pass around a drainage pond;
- temporary diversion of Blackwell Footpath B3/12/2, for a period of one year, with user diverted to the south along Blackwell Footpath B3/10/5 and B3/12/2. On completion of construction, Blackwell Footpath B3/12/2 would be permanently diverted east of its current alignment to connect with the Silverhill Trail (NCN route 67); and
- permanent closure of Blackwell Footpath B3/13/1.

2.3.69 There would also be utilities works managed from this compound.

Sheffield spur main compound

2.3.70 This compound (see Map CT-05-448b, H6 to J7) would be used to manage civil engineering works and provide main compound support to two satellite compounds in the Pinxton to Newton and Huthwaite area, as illustrated in Figure 5, for a period of three years and nine months. This compound would also be used to manage civil engineering works, railway systems works and provide main compound support to three satellite compounds in the Stonebroom to Clay Cross area (see Volume 2: Community area report LA09: Stonebroom to Clay Cross) as illustrated in Figure 4.

2.3.71 The works to be managed from this compound would require demolition of the following buildings and structures, as described in Table 4.

Table 4: Demolitions required as a result of the works to be managed from the Sheffield spur main compound

Description	Location	Feature resulting in the demolition
Residential		
Residential property	The Hideaway, Pasture Lane, Hilcote	Hilcote west embankment
Commercial		
Commercial business at the Hideaway	Pasture Lane, Hilcote	Hilcote west embankment
Other		
Shed	B6406 New Lane, Hilcote	Hilcote west embankment
Shed	Pasture Lane, Hilcote	Hilcote west embankment

2.3.72 The compound would be used to manage the construction of the Normanton Brook west and central viaducts, which would take two years and three months to complete.

2.3.73 The compound would be used to manage the construction of the following earthworks:

- Cartwright Lane cutting, which would take two years and 12 months to complete;
- Cartwright Lane dive under, which would take two years and nine months to complete;
- Normanton Brook west embankment, which would take two years and 12 months to complete; and
- Hilcote west embankment, which would take three years and six months to complete.

2.3.74 The compound would be used to manage the construction of the Alfreton Road box structures, which would take two years and nine months to complete.

2.3.75 A pre-cast yard and pre-cast laydown area to manufacture and store concrete elements, such as viaduct beams to facilitate the construction of the Normanton Brook west and central viaduct, would be located at this compound for a period of two years and one month, accessed from the Export Drive via Common Road (Volume 2: Map CT-05-203, G8 to F6).

2.3.76 There would be one transfer node associated with the Sheffield spur main compound within the Newton to Pinxton and Huthwaite area. The transfer node would occupy land to the south of B6026 Huthwaite Lane, west of the Proposed Scheme. The transfer node would be operational from 2025 for five years and one month. Access to the site would be from the A38 Alfreton Road using the site haul route.

2.3.77 The works to be managed from this compound would require the temporary diversion of Blackwell Trail, for a period of four weeks, for the construction of the construction of the Normanton Brook west and central viaducts.

2.3.78 There would also be utilities works managed from this compound.

M1 south satellite compound

2.3.79 This compound (see Map CT-05-448b, D6 to E8) would be used to manage civil engineering works in the Pinxton to Newton and Huthwaite area, as illustrated in Figure 5.

2.3.80 The works to be managed from this compound would require demolition of the following buildings and structures, as described in Table 5.

Table 5: Demolitions to be managed from the M1 south satellite compound

Description	Location	Feature resulting in the demolition
Residential		
Residential property and outbuildings	Craig House, B6026 Cragg Lane, Old Blackwell	Newton east cutting
Residential property	The Cottage, B6026 Huthwaite Lane, Old Blackwell	Newton east cutting
Residential property	Devonshire Cottage, B6026 Cragg Lane, Old Blackwell	Newton east cutting
Residential property and outbuildings	Bowcher House, B6026 Huthwaite Lane, Old Blackwell	Newton east cutting
Commercial		
Hotel and outbuildings	Robin Hood, B6026 Huthwaite Lane, Blackwell	Newton east cutting

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

- B6406 New Lane overbridge, which would take one year and three months to complete; and
- B6026 Cragg Lane overbridge, which would take one year and six months to complete.

2.3.82 The compound would be used to manage the construction of the following earthworks:

- the Hilcote cutting, which would take two years to complete; and
- the Newton east cutting, which would take three years and nine months to complete.

2.3.83 The compound would be used to construct the M1 Blackwell box structure, which would take two years and four months to complete.

2.3.84 The works to be managed from this compound would require the following works to public roads:

- permanent diversion of B6406 New Lane, south of its existing alignment to align with New Lane overbridge. It would take one year to complete. The realignment would be built offline and on completion of construction, temporary local lane closures and traffic management measures would be implemented for three weeks enable connection of the realigned road to the existing road;
- permanent diversion of B6026 Huthwaite Lane, to tie into the B6026 Cragg Lane overbridge. It would take 12 months to complete. The realignment would be built offline and on completion of construction, temporary local lane closures and traffic management measures would be implemented for three weeks to enable connection of the realigned road to the existing road; and
- permanent diversion of B6026 Cragg Lane, south of its existing alignment to align to align with the B6026 Cragg Lane overbridge. It would take 12 months to complete. The realignment would be built offline and on completion of construction, temporary local lane closures and traffic management measures would be implemented for three weeks to enable connection of the realigned road to the existing road.

2.3.85 The works to PRoW to be managed from this compound would be the closure of Blackwell Footpath B3/8/1.

2.3.86 There would also be utilities works managed from this compound.

Alfreton Road satellite compound

2.3.87 This compound (see Map CT-05-602a, B4 to B5) would be used to manage civil engineering works in the Pinxton to Newton and Huthwaite area, as illustrated in Figure 5.

2.3.88 The works to be managed from this compound would require demolition of the following buildings and structures, as described in Table 6.

Table 6: Demolitions to be managed from the Alfreton Road satellite compound

Description	Location	Feature resulting in the demolition
Residential		
18 residential properties and outbuildings on Alfreton Road	Alfreton Road, Newton	Alfreton Road box structure

2.3.89 The compound would be used to construct the Alfreton Road box structure, which would take two years to complete.

2.3.90 The compound would be used to manage the construction of the following earthworks:

- Newton west cutting, which would take one year and nine months to complete; and
- Newton embankment, which would take two years and three months to complete.

2.3.91 The works to public roads to be managed from this compound would include temporary traffic management along Alfreton Road, to construct the Alfreton Road box structures. It would take one year and nine months to complete. The first realignment would be built offline and on completion of construction, temporary local lane closures and traffic management measures would be implemented for 2 weeks to enable connection of the realigned road to the existing road. Upon completion of the first half of the Alfreton Road box structure a second realignment would be built offline over the box structure and on completion of construction, temporary local lane closures and traffic management measures would be implemented for two weeks to enable connection of the realigned road to the existing road. Upon completion of the second half of the box structure the permanent alignment would be reinstated and on completion of construction, temporary local lane closures and traffic management measures would be implemented for two weeks to enable connection of the realigned road to the existing road.

2.3.92 There would also be utilities works managed from this compound.

2.3.93 The M1 crossing at Blackwell would carry the Sheffield spur under the motorway. The crossing would be constructed using standard construction techniques. To maintain safe operation of the motorway it would be necessary to undertake the works under traffic management. The construction of the motorway crossings in this area would be coordinated to reduce the overall duration of disruption to the motorway. The traffic management would be likely to include temporary speed restrictions for safety, temporary use of the hard shoulder, and reduced lane widths. Night-time closures are also likely to be required to enable installation of the deck over the carriageways and modifications to the motorway signage.

Construction waste and material resources

2.3.94 Excavated material 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.

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

2.3.96 Local excess or shortfall of excavated material within the Pinxton to Newton and Huthwaite area would be managed through the mitigation earthworks 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.

2.3.97 Forecasts of the amount of waste generated at temporary worker accommodation sites will be reported in the formal ES.

Commissioning of the railway

2.3.98 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

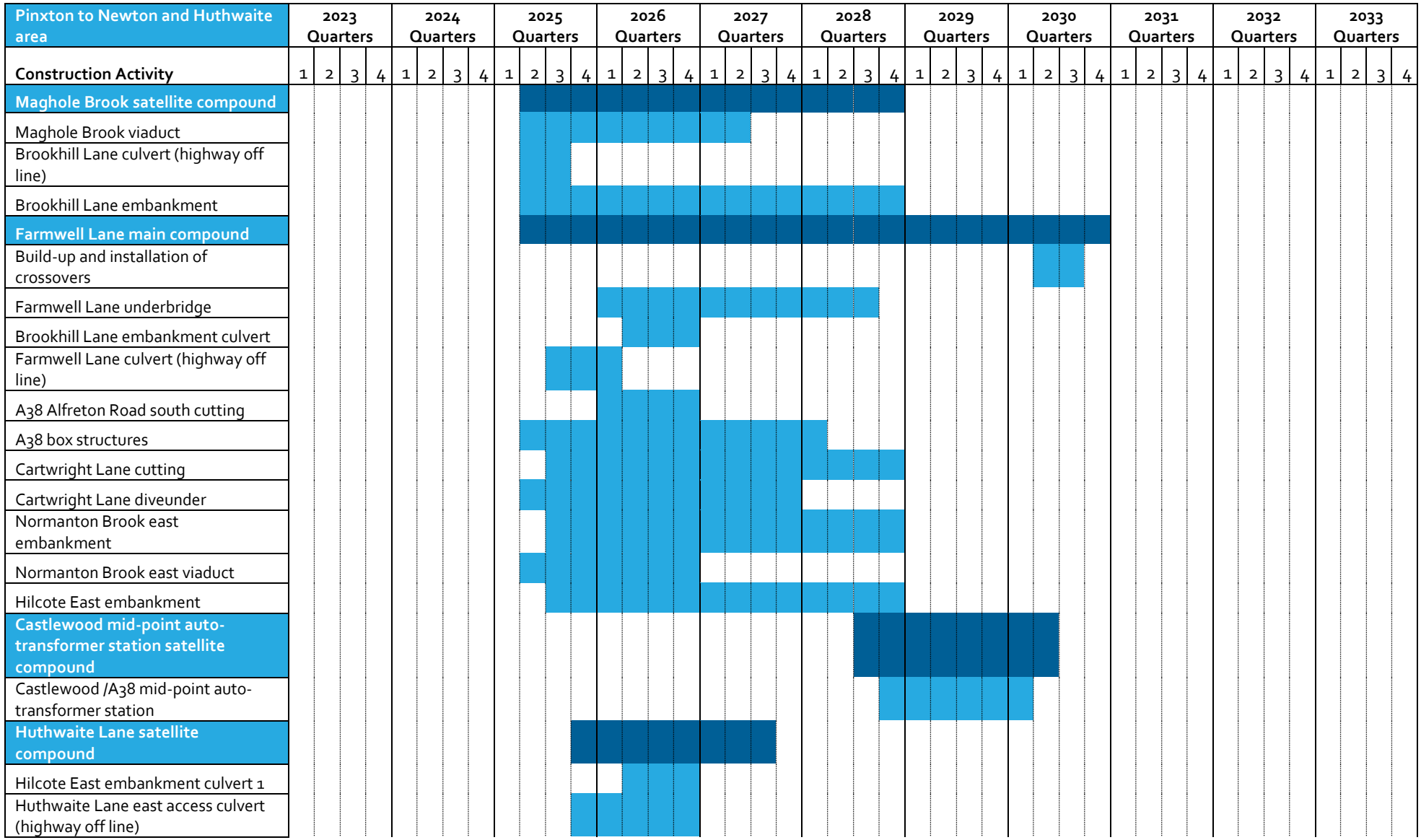
2.3.99 A construction programme illustrating indicative periods for each of the core construction activities described above is provided in Figure 7. Construction durations referred to in the following sections of this report are based on this indicative programme.

Monitoring during construction

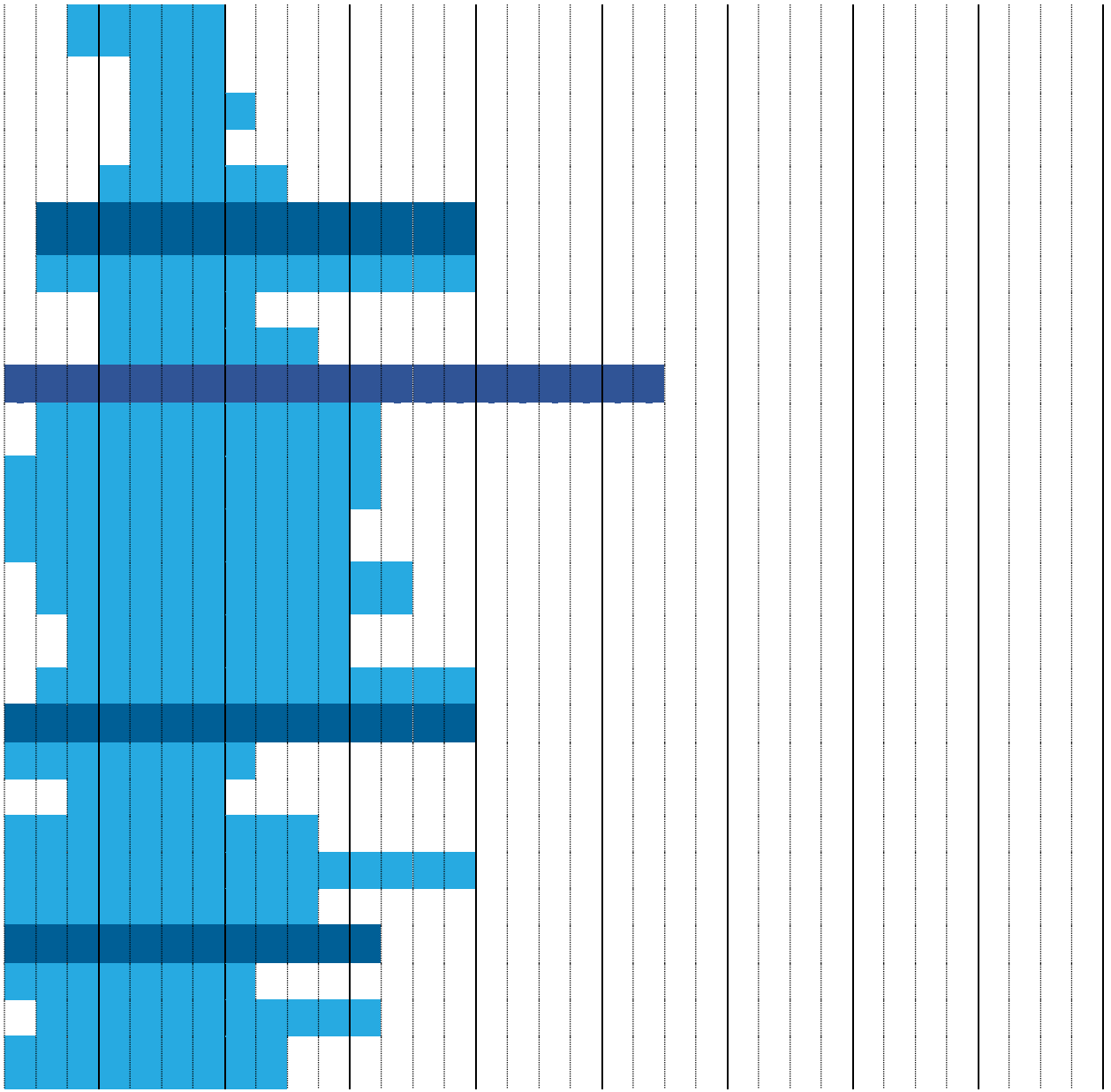
2.3.100 The appointed contractor would be required to undertake the necessary monitoring for each environmental topic to comply with the requirements of the CoCP, the relevant LEMP and any additional consent requirements. Any actions that may be necessary for compliance would be reported to the nominated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

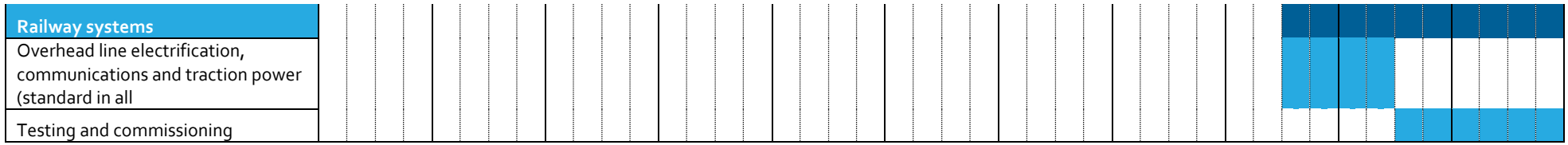
2.3.101 The CoCP and the relevant LEMP would set out inspection and monitoring procedures to assess the effectiveness of measures to prevent or reduce environmental effects during construction. Relevant local authorities and consenting authorities, such as the Environment Agency, would be consulted on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

Figure 7: Indicative construction programme between 2023 and 2033



Huthwaite Lane culvert (highway off line)
Hilcote East embankment culvert 2
B6026 Huthwaite Lane underbridge
Hilcote East embankment culvert 3
Hilcote East embankment culvert 4
Newtonwood Lane satellite compound
Tibshelf cutting
Silverhill Trail overbridge
Newtonwood Lane overbridge
Sheffield Spur main compound
Alfreton Road box structures (Spur box)
Cartwright Lane cutting
Cartwright Lane diveunder
Normanton Brook west embankment
Normanton Brook west and Central viaduct
Hilcote west embankment
M1 south satellite compound
Hilcote cutting
B6406 New Lane overbridge
M1 Blackwell box structure
Newton east cutting
B6026 Cragg Lane overbridge
Alfreton Road satellite compound
Alfreton Road box structure
Newton West cutting
Newton embankment




Railway systems
Overhead line electrification, communications and traction power (standard in all
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 Pinxton to Newton and Huthwaite area. Volume 1, Section 4 describes the envisaged operational characteristics of the Proposed Scheme as a whole, including Phase One, Phase 2a and Phase 2b.

HS2 services

2.4.2 It is anticipated that there would be up to 11 trains per hour each way on the HS2 main line, south of the Sheffield spur passing through the Pinxton to Newton and Huthwaite area. North of the Sheffield spur, it is anticipated that up to seven trains per hour each way would continue on the HS2 main line. On the Sheffield spur towards, the Stonebroom to Clay Cross area, it is anticipated that there would be up to 4 trains per hour each way. 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 depot in the Staveley to Aston area. Further information on the Staveley depot 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 report 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 during operation prior to construction commencement.

2.5 Route section alternatives

Sheffield spur dive under

2.5.1 During the design development process since the announcement of the preferred route in July 2017, further consideration has been given to the northbound section of the Sheffield spur to allow it to pass under the HS2 main line. Alternative options in this location, near Cartwright Lane cutting, have been considered and opportunities to reduce the impacts of the structure, associated infrastructure and maintenance requirements were considered.

2.5.2 The following three options were taken forward to a more detailed appraisal where engineering and construction feasibility, cost and environmental impacts were considered:

- Option 0: the spur would be in a 520m long cut and cover tunnel from south of the A38 Alfreton Road to beyond the HS2 main line crossing;
- Option A: the spur would pass through a 220m dive under structure[25] within an open cut with a 1 in 3.5 slope; and
- Option B: the spur would pass through a 220m dive under structure with a retaining wall along the eastern side of the northbound spur.

2.5.3 Table 7 provides a summary of the outcomes of the preliminary appraisal of the alternative options described above.

Table 7: Consideration of local alternatives for route of the Proposed Scheme through the divergence of the Sheffield spur and HS2 main line

Option	Outcome of analysis	Further action/considerations
Option 0	• Less land required for the cut and cover tunnel structure compared to the Proposed Scheme due to a reduction in the width of the cutting. • Lower landscape and visual impacts compared to the Proposed Scheme, with the cut and cover tunnel being covered and screened by the cutting for the HS2 main line. • Slightly lower air quality and noise impacts during construction compared to the Proposed Scheme due to a shorter construction duration and lower earthwork volumes. • Greater potential for disturbance to nearby receptors, including	This option will not be subject to further consideration.

[25] A railway junction at which one or more diverging or converging tracks in a multiple-track route pass under a structure containing other tracks on the route to avoid conflicting train movements.

Option	Outcome of analysis	Further action/considerations
	residents along Cartwright Lane, users of Sutton-in-Ashfield Footpath 41, Wincobank Farm and Berristow Farm once operational, as a result of the jet fan ventilation and other mechanical equipment necessary for the tunnel during operation compared to the Proposed Scheme. • Relatively complex cut and cover box within significant excavation compared to the Proposed Scheme, requiring escape stairs, a mechanical and electrical building, fit out, and access roads at each portal. • Greater health and safety risks due to the complex construction techniques compared to the Proposed Scheme. • Shorter construction period than the Proposed Scheme. • Higher costs compared to the Proposed Scheme.	
Option A (the Proposed Scheme)	• Greater area of land required for the dive under structure and material waste generation due to greater width of the cutting, compared to the alternative options. • Slightly greater landscape and visual impacts due to wider cutting and a greater loss of hedgerows compared to the alternative options. • Slightly worse air quality and noise impacts during construction compared to the options, attributed to an increased construction duration and earthwork volumes compared to the alternatives considered. • Less disturbance to local receptors, including residents along Cartwright Lane, users of Sutton-in-Ashfield Footpath 41, Wincobank Farm and Berristow Farm, once operational due to reduced maintenance requirements and jet fan ventilation and other mechanical equipment not required compared to Option 0, but similar to Option B. • Simpler construction method and no requirement for access road, escape stairs, mechanical and electrical fit out, headhouse and reduced maintenance requirements compared to the Option 0, but similar to Option B. • Less health and safety requirements compared to the Option 0 and similar requirements to Option B. • Longest construction period of all options considered (increase of 20 weeks) compared to the alternative options. • Lower cost compared to the options, particularly Option 0.	This option has been taken forward into the Proposed Scheme.
Option B	• Less land required for the dive under structure and less waste material generation compared to the Proposed Scheme due to reduced cutting width required. • Slightly lower landscape and visual impacts compared to the Proposed Scheme due to slightly less land requirements. • Slightly lower air quality and noise impacts on receptors along Cartwright Lane compared to the Proposed Scheme, attributed to a reduced construction duration and amount of earthwork volumes.	This option has not been included in the Proposed Scheme presented in this report.

Option	Outcome of analysis	Further action/considerations
	• Similar disturbance to receptors, including residents along Cartwright Lane, users of Sutton-in-Ashfield Footpath 41, Wincobank Farm and Berristow Farm, as the Proposed Scheme once operational, would have reduced maintenance requirements with jet fan ventilation and other mechanical equipment not required. • Similar access and maintenance requirements to the Proposed Scheme. • Shorter construction period compared to the Proposed Scheme. • Similar health and safety risks as the Proposed Scheme. • Lower construction costs compared to the Proposed Scheme.	

2.5.4 Option A was taken forward into the Proposed Scheme. Whilst Option A would require a greater area of land for the dive under structure, take longer to construct and would have greater landscape and visual impacts when compared to Option 0, Option A could be constructed using a simpler construction method and would cost less to construct. Option A would also reduce the long term maintenance requirements and disturbance to nearby land holders associated with the mechanical and electrical equipment associated with Option 0.

2.5.5 Option B would require slightly less land than Option A, but would otherwise be a similar structure to Option A. However, the extent and cost of utility diversions for either option, including for an above ground gas installation along Cartwright Lane, are currently unknown. Further studies will be carried out to consider Option A and B as the design develops, the outcome of which will be reported in the formal ES.

Sheffield spur alignment

2.5.6 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. 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. The Sheffield spur would cross the Pinxton to Newton and Huthwaite area, as well as the Stonebroom to Clay Cross area (LA09) and the Tibshelf to Shuttlewood area (LA10).

2.5.7 The following four options were taken forward to a more detailed appraisal where engineering and construction feasibility, cost and environmental impacts were considered:

- Option 0: the spur would provide a link between the HS2 main line near Pinxton to the Erewash Valley Line near Danesmoor. The Sheffield spur would run in a south-east to north-west direction for 9.5km and would pass the communities of Hilcote, Old Blackwell, Blackwell, Stonebroom, Morton and Danesmoor;
- Option 3: the spur would provide a link between the HS2 main line near

Huthwaite to the Erewash Valley Line near Church Hill. The spur would run in an east to west direction for 8km and would pass the communities of Newton, Tibshelf, Stonebroom, Morton and Danesmoor;

- Option 4: the spur would provide a link between the HS2 main line near Tibshelf to the Erewash Valley Line near Church Hill. The spur would run in an east to west direction for 7.5km and would pass the communities of Tibshelf, Hardstoft, Pilseley, Lower Pilsley, Danesmoor and Church Hill; and
- Option 5: the spur would provide a link between the HS2 main line near Tibshelf to the MML near Grassmoor. The spur would run in a south-east to north-west direction for 11km and would pass the communities of Tibshelf, Hardstoft, Astwith, Holmewood, North Wingfield and Grassmoor.

2.5.8 Table 8 provides a summary of the outcomes of the preliminary appraisal of the alternative options described above.

Table 8: Consideration of local alternatives for the alignment of the Sheffield spur

Option	Outcome of analysis	Further action/considerations
Option 0 (the Proposed Scheme)	• Reduced magnitude of adverse impacts on the National Trust Hardwick Hall estate compared to Options 4 and 5, which includes the Grade I listed Hardwick Old Hall and the Grade I listed Hardwick Hall, several Grade II listed assets, a Grade I registered park and gardens and a scheduled monument. Greater adverse impacts on historic environment than Option 3 due to impacts to Old Blackwell Conservation Area and Newton Conservation Area, but similar impact on the Grade I listed Church of St. Lawrence in North Wingfield. • Reduced landscape and visual impacts compared to the alternative options. Compared with Option 3, there would be reduced landscape and visual impacts for users of the Silverhill Trail National Cycle Network (NCN) route 67, a traffic-free cycle route and part of the Phoenix Greenways network and properties along Newtonwood Lane. There would be a greater impact on the views from the Old Blackwell Conservation Area and Newton Conservation Area compared to Options 3, 4 and 5. There would be less landscape and visual impacts compared Options 4 and 5 due to the spur running through a less open, agricultural landscape and there would be worsening of views from Hardwick Hall estate. • Fewer ecological impacts compared to Option 5, avoiding direct impacts on Avenue Washlands wetlands nature reserve, but greater impacts compared to Option 4 affecting more areas of ancient woodland and priority habitat. Similar impacts to Option 3, with remodelling of the Erewash Valley Line affecting Padley Wood Ancient Woodland and the Derbyshire Wildlife Trust reserve at North Wingfield, which is known to support water voles and pockets of priority habitat, some of which are designated as local wildlife sites. • Less impacts on Grade 3 agricultural land compared to Options 4 and 5, however, greater loss of agricultural land, farms and their access compared to Option 3. • Lower air quality and noise impacts compared to the alternative options, attributed to less earthworks, construction plant and	This is the selected option taken forward into the Proposed Scheme.

Option	Outcome of analysis	Further action/considerations
	construction traffic. • Greater land quality impacts compared to the alternatives considered, with the route constructed through Blackwell and Cragg Lane historic landfill sites; the latter of which is known to contain a high risk for contaminated land and hazardous waste. • Less traffic impacts compared to Options 4 and 5 and similar impacts to Option 3. Notable impacts relate to temporary off-line diversion of the M1 with disruption to the motorway and trunk road networks (A38, B6014) and other local roads. • Less community impacts compared to the Options 4 and 5, affecting fewer communities and inter-connected villages, however, would directly affect Old Blackwell, Blackwell, Newton and Stonebroom. Impacts on these villages associated with this option would be greater than Option 3. Direct impacts to the Doe Hill Community Park would be similar to Option 3, which is not impacted by Options 4 and 5. This option does not require the demolition of community facilities, including the Pilsley Cricket Club, associated with Option 4, nor does it impact The Avenue Washlands wetlands nature reserve associated with Option 5. • Fewer total demolitions compared to Option 5, however, more demolitions compared to Option 3 and 4. • Similar works required to remodel and increase the number of tracks (from four to six) along a 5km section of the Erewash Valley Line and MML and provide overhead line electrification to the Erewash Valley Line used by HS2, compared to Options 3 and 4. There would be a need to remodel the existing rail junction in the Clay Cross area. Greater remodelling work required compared to Option 5. • Shorter route length compared with Options 3 and 4, but a longer route length compared to Option 5. Corresponding journey times would be shorter than under Option 3, but longer than under Options 4 and 5. • Similar health and safety risks during construction compared to the Options 3 and 4, however, increased risks compared to Option 5. • Similar construction period and complexities compared to Option 3. Shorter overall construction period and reduced construction complexities when compared with Options 4 and 5. • Less overall cost compared to the alternatives considered.	
Option 3	• Less impact upon the historic environment when compared to the Proposed Scheme as this option would avoid impacts on the Old Blackwell Conservation Area and the Newton Conservation Area and the listed buildings within them. Impacts to the Hardwick Hall estate would be broadly similar to the Proposed Scheme. • Overall there would be greater landscape and visual impacts compared to the Proposed Scheme, with greater impacts on properties along Newtonwood Lane and users of the Silverhill Trail NCN route 67 as a result of utilising the disused railway corridor for the spur. However, there would be improvements to views from the Old Blackwell Conservation Area and the Newton Conservation	This option will not be subject to further consideration.

Option	Outcome of analysis	Further action/considerations
	Area when compared to the Proposed Scheme. • Similar ecological impacts to the Proposed Scheme. Similar impacts on the Padley Wood Ancient Woodland and the nature reserve at North Wingfield. Slightly greater impacts to priority habitats between Tibshelf and Newton, including designated local wildlife sites compared to the Proposed Scheme. • Fewer impacts on agricultural land compared to the Proposed Scheme as the spur would be shorter in length and constructed across less agricultural land, utilising the disused mineral railway line. • Slightly greater air quality and noise impacts compared to the Proposed Scheme, attributed to more earthworks, construction plant and construction traffic. • Less impacts associated with land quality compared to the Proposed Scheme as would avoid impacts on Blackwell and Cragg Lane historic landfill sites. • Whilst the route would reduce complexity of local road crossings, construction traffic may put pressure on the local road network. Overall the impacts for traffic are considered to be broadly similar to the Proposed Scheme. • Less community impacts compared to the Proposed Scheme, with no impacts on the communities of Old Blackwell, Blackwell or Newton. Use of the redundant railway cutting would provide a degree of separation from Tibshelf and Newton, however, would result in realignment of Sliverhill Trail NCN route 67 and a further 11 PRoW. Impacts to Doe Hill Community Park and Saw Pit Industrial Estate would be similar to the Proposed Scheme. • Fewer demolitions compared to the Proposed Scheme. • Similar remodelling works required to the Erewash Valley Line compared to the Proposed Scheme. • Longer route length compared to the Proposed Scheme, however, a small increase in journey time. • Similar health and safety risks during construction compared to the Proposed Scheme. • Similar construction period and complexities compared to the Proposed Scheme. • Slightly higher costs compared to the Proposed Scheme.	
Option 4	• Greater impacts on the historic environment compared to the Proposed Scheme due to impacts on the Grade I listed Hardwick Hall and National Trust Hardwick Hall estate due to an increased in the vertical alignment of the HS2 main line. Direct impact on the setting of the Hardsoft Conservation Area, however, avoids impacts on the Old Blackwell Conservation Area and the Newton Conservation Area associated with the Proposed Scheme. Similar impacts on the Grade I listed Church of St Lawrence compared to the Proposed Scheme. • Greater landscape and visual impacts compared to the Proposed	This option will not be subject to further consideration.

Option	Outcome of analysis	Further action/considerations
	Scheme as the spur would cross through a significantly more open, agricultural landscape. The spur would affect a larger number of residential areas, as well as users of the Five Pits trail, which would have greater impacts than the Proposed Scheme. There would be a greater impact on views from the Hardwick Hall estate. • Fewer impacts on ecology compared to the Proposed Scheme, with no impacts on Padley Wood Ancient Woodland and similar impacts on the nature reserve at North Wingfield. The spur would cross fewer areas of priority habitats compared to the Proposed Scheme. However, the increase in the length of spur would require the greater loss of hedgerows and would cross a greater area of habitats, compared to the Proposed Scheme. • Greater impacts on farms and agricultural land resulting in a greater loss of hedgerows, compared to the Proposed Scheme, due to longer length of the spur. • Greater air quality and noise impacts compared to the Proposed Scheme, attributed to more earthworks, construction plant and construction traffic. • Less impact associated with land quality compared to the Proposed Scheme as would avoid impacts on Blackwell and Cragg Lane historic landfill sites. • Greater impacts with regards to traffic and transport in comparison to the Proposed Scheme arising from construction traffic on the local road network due the significant increase in earthworks. Whilst this option would require less road re-alignments in comparison to the Proposed Scheme, there would be a major worsening for users of the B6014 Mansfield Road as a result of temporary closure for at least 18 months. • Greater community impacts compared to the Proposed Scheme, including the direct and indirect impacts on the communities of Pilsley, Lower Pilsley and Hardsoft, leading to connectively issues during construction. This option would require demolition of several community facilities, including the Pilsley Cricket Club and would affect a total of eight PRoW. No impact to Doe Hill Community Park, unlike the Proposed Scheme. • Fewer residential demolitions compared to the Proposed Scheme. However, there would be more industrial demolitions and demolition of several community facilities, including the Pilsley Cricket Club. • Similar remodelling works to the Erewash Valley Line required compared to the Proposed Scheme. • Longer route length compared to the Proposed Scheme, however a small reduction in journey time. • Similar health and safety risks during construction compared to the Proposed Scheme. • Increased construction period and construction complexities when compared to the Proposed Scheme. • Slightly higher cost compared to the Proposed Scheme.	

Option	Outcome of analysis	Further action/considerations
Option 5	• Greater impacts on the historic environment compared to the Proposed Scheme due to impacts on the Grade I listed Hardwick Hall and National Trust Hardwick Hall estate due to an increased vertical alignment of the HS2 main line. Direct impact on the Astwith Conservation Area and realignment of the historic road, Branch Lane. However, avoids impacts on the Old Blackwell Conservation Area and Newton Conservation Area associated with the Proposed Scheme. Similar impact to the Proposed Scheme on the Grade I listed Church of St. Lawrence. • Greater landscape and visual impacts compared to the Proposed Scheme as the spur would cross through a more open, agricultural landscape. The spur would affect a larger number of residential areas, as well as users of the Five Pits trail, which would have a greater impact than the Proposed Scheme. • Greater ecological impacts compared to the Proposed Scheme, with impacts on the Avenue Washlands wetlands nature reserve, which is known to support European protected species. This would sever a local wildlife site east of Hardsoft, require the greater loss of hedgerows and would cross a greater area of habitats compared to the Proposed Scheme. However, there would be no impacts on Padley Wood Ancient Woodland and no impacts on the nature reserve at North Wingfield. The spur would cross fewer areas of priority habitats compared to the Proposed Scheme. • Greater impact on agricultural land, including affecting more Grade 3 agricultural land, and would affect a greater number of farms and agricultural land parcels, compared to the Proposed Scheme, due to longer length of the spur. • Greater air quality and noise impacts compared to the Proposed Scheme, attributed to more earthworks, construction plant and construction traffic. • Less impact associated with land quality compared to the Proposed Scheme as would avoid impacts on Blackwell and Cragg Lane historic landfill sites. • Greater traffic and transport impacts compared to the Proposed Scheme due to additional impacts on the A6175 and the B6039 resulting in disruption to the local road network. Realignment would be required for Chesterfield Road and Hagg Hill Road, connecting the community of North Wingfield with Holmewood and creating some individual property isolation south of Grassmoor. • Greater community impacts compared to the Proposed Scheme, including the severance of communities and inter-connected villages, including Hardsoft, Astwith, Holmewood, North Wingfield, Church Hill and Grassmoor. Severance impacts for Astwith, Stainsby, Holmewood, Temple Normanton and Grassmoor, with 21 PRoW affected. No impacts to Doe Hill Community Park, unlike the Proposed Scheme. • Greater number of residential and industrial demolitions compared to the Proposed Scheme. • No remodelling works required on the Erewash Valley Line. Less remodelling works required on the MML, with no need increase the number of existing Network Rail tracks or remodel existing rail	This option will not be subject to further consideration.

Option	Outcome of analysis	Further action/considerations
	junction in the Clay Cross area, compared to the Proposed Scheme. This would require the provision of a single span bridge over the four track MML. • Shorter length of spur compared to the Proposed Scheme, with a reduction in journey times. • Slightly lower health and safety risks during construction compared to the Proposed Scheme. • Increased construction period and construction complexities when compared to the Proposed Scheme. • Substantially higher costs compared to the Proposed Scheme.	

2.5.9 Option 0 was taken forward into the Proposed Scheme. Option 3 was considered to have broadly similar impacts on the Hardwick Hall estate and on ecological receptors, and would take a similar duration to construct compared to Option 0. Option 3 would also have a slightly lesser impact on the setting of the two conservation areas, two historic landfill sites, agricultural land and local communities, and would result in fewer demolitions compared to Option 0. However, Option 3 would result in greater landscape and visual impacts, including on users of the Silverhill Trail NCN route 67, slightly greater air quality and noise impacts attributed to greater earthworks, construction plant and construction traffic and would result in longer journey times for users, as well as an increase in the costs compared to Option 0.

2.5.10 Options 4 and 5 would result in greater impacts on the setting of the Grade I listed Hardwick Hall and National Trust Hardwick Hall estate, greater landscape and visual impacts, increased impacts on farms and agricultural land and a greater impact on community facilities, compared to Option 0. Furthermore, these options would also result in a longer construction programme, increase in length of the spur and more complex construction, more disruption to existing infrastructure and an increase in costs compared to Option 0. However, Option 5 would require less remodelling of the MML and existing rail junction in the Clay Cross area, which would have less of an impact compared to the Proposed Scheme.

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 2b 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 9.

Table 9: 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

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 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 and the assessment and identification of mitigation opportunities for the Pinxton to Newton and Huthwaite 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 Pinxton to Newton and Huthwaite area since the initial preferred route announcement in November 2016, and which are informing the Proposed Scheme are:

- temporary and permanent land requirements during construction and operation including Pinxton Footpath B8/1/1;
- refining the location of balancing ponds and environmental mitigation to minimise 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 public rights of way (PRoW);
- temporary and permanent changes to road access including impacts to B6026 Huthwaite Lane, B6026 Cragg Lane and Alfreton Road;
- traffic impacts on local roads during construction of the Proposed Scheme including to the A38 Alfreton road and Newtonwood Lane;
- temporary and permanent noise impacts;

- impacts on access to local community educational/care/sporting/leisure/cultural facilities;
- impacts to local businesses and their access;
- permanent severance of communities including Blackwell and Newton; and
- impacts to properties and resident relocation.

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 Pinxton to Newton and Huthwaite area include a range of local interest groups, local facility and service providers, places of worship, schools and educational establishments, cultural, leisure and sports stakeholders.

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, whilst 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 10 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 10: Engagement to date with community stakeholders

Stakeholder	Area of focus
Bolsover Councillors	Meeting to discuss the design and project progress. Also to discuss concerns raised and opportunities to assist the design development in reducing impacts to the local area and residents.
Derbyshire County	Meeting to discuss the design and project progress. Also to discuss concerns raised and opportunities

Stakeholder	Area of focus
Councillors	to assist the design development in reducing impacts to the local area and residents.
Nottinghamshire Resilience Forum	Meeting to discuss the likely impacts to the road network in the Nottinghamshire area arising from the construction of the Proposed Scheme.
Nottinghamshire Local Access Forum	Meeting to discuss the likely impacts to open spaces and footpaths.
Derbyshire Local Access Forum	Meeting to discuss the likely impacts to use of and access to open spaces and footpaths.
Autism East Midlands	Meeting to discuss progress of the Proposed Scheme and to identify locations of facilities used by local stakeholders.
Nottinghamshire Ramblers	Meeting to discuss progress of the Proposed Scheme, gather any concerns and determine the best way of meeting in future to discuss likely impacts to PRoW as a result of the Proposed Scheme.
Hilcote Environmental Leisure Project (HELP)	Site visit to the project's area and engagement to understand activities carried out, ownership and management of land. Also, to understand volunteers' concerns and provide information on how the Proposed Scheme is progressing.
Friends of Doe Hill Community Park	Site visit to Doe Hill Park and engagement to understand local concerns, impacts on the country park and provide information on how the Proposed Scheme is progressing.
Blackwell & Newton Action Group	Presentation provided on how the Proposed Scheme is progressing and to provide feedback to action group's questions and concerns.
All Saints Centre, Huthwaite	Meeting to discuss progress of the Proposed Scheme and understand local concerns.
St Michaels and All Angels Church, South Normanton	Meeting to discuss progress of the Proposed Scheme and understand local concerns.

Local authorities and parish councils

3.4.6 Direct engagement has been offered to and undertaken with county, borough, district and parish councils within the Pinxton to Newton and Huthwaite 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 11.

Table 11: Engagement to date with local authorities and parish councils

Stakeholder	Area of focus
Derbyshire County Council	Engagement to provide an update on the Proposed Scheme and understand the local conditions and factors to inform scheme design and WDES.
	Meeting to discuss likely impacts to highways, including local roads, trunk roads and highway assets.
	Meeting to discuss the Traffic and transport assessment and local constraints.
	Meeting to discuss landscape viewpoints used within the visual assessment and to discuss the historic environment assessment; including sensitive local heritage assets and any likely impacts to them from the Proposed Scheme.
	Meeting to discuss sensitive ecological receptors, plans for mitigation and gather information to assist the ecological assessment within the working draft Environmental Statement.
Nottinghamshire County Council	Engagement to provide an update on the Proposed Scheme and understand the local conditions and factors to inform scheme design and WDES.
	Meeting to discuss likely impacts to highways, including local roads, trunk roads and highway assets.
	Engagement around the landscape and visual assessment and to discuss representative viewpoint and photomontage locations.
	Meeting to discuss sensitive ecological receptors, plans for mitigation and gather information to assist the ecological assessment within the working draft Environmental Statement.
East Midlands Councils	Engagement to provide an update on the Proposed Scheme and understand the local conditions and factors to inform scheme design and WDES.
	Meeting to discuss likely impacts to highways, including local roads, trunk roads and highway assets.
	Meeting to discuss the Traffic and Transport assessment and local constraints.
	Meeting to discuss development of the East Midlands Hub station
	Meeting to discuss participation in the East Midlands Councils' HS2 mitigation group
Bolsover District Council	Engagement to provide an update on the Proposed Scheme and understand the local conditions and factors to inform scheme design and WDES.
	Engagement around the landscape and visual assessment and to discuss representative viewpoint and photomontage locations.
Ashfield District Council	Engagement to provide an update on the Proposed Scheme and understand the local conditions and factors to inform scheme design and WDES.

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)[26].

[26] Supporting document: Draft Code of Construction Practice

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;
- Coal Authority;
- Department of Environment, Food and Rural Affairs;
- 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;
- Ramblers Association;
- Royal Agricultural Society;
- Royal Society for the Protection of Birds;
- Royal Society of Wildlife Trusts/The Wildlife Trusts;
- Woodland Trust;
- Nottinghamshire Wildlife Trust; and
- Derbyshire Wildlife 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 Network Rail, Severn Trent Water, Cadent and the Oil and Pipelines Agency to establish what infrastructure exists in the Pinxton to Newton and Huthwaite 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 Pinxton to Newton and Huthwaite 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 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 and 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 Pinxton to Newton and Huthwaite area, information events were held at Newton Methodist Church on 6 and 7 June and 6 July 2018. Facilities were available at the events for affected individuals, major asset owners and businesses to have private meetings with HS2 staff.

3.4.19 Engagement has been undertaken with Castlewood Business Park and McArthur Glen Retail Outlet.

3.4.20 HS2 Ltd is continuing to engage with directly affected individuals, major asset owners and businesses, 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 Pinxton to Newton and Huthwaite 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[27].

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: LA08 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)[28].

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)[29] 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

[27] 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
[28] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report
[29] 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 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 Pinxton to Newton and Huthwaite 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 Pinxton to Newton and Huthwaite area is provided in Section 10, Land quality and Section 15, Water resources and flood risk. The underlying geology is mapped by the British Geological

Survey (BGS)[30]. Superficial deposits of alluvium, usually comprising compressible silty clay, occur along Maghole Brook in the south of the study area, Normanton Brook and Nunn Brook in the centre and north of the study area and the tributaries of all three brooks.

4.3.3 The bedrock throughout the study area is primarily of Carboniferous-age interbedded mudstone, siltstone and pale grey sandstone of the Pennine Middle Coal Measures Formation of the Pennine Coal Measures Group. The formation includes frequent coal seams and marine fossils. There are also localised outcrops of the younger Cadeby Formation of the Zechstein Group in the north of the study area which comprises dolostone with subordinated mudstone, dolomitic siltstone and sandstone.

Topography and drainage

4.3.4 The main topographic features of the study area are the valleys of Normanton Brook and Maghole Brook, which have cut channels into the underlying mudstone and siltstone. A minor, narrow valley containing Nunn Brook connects with Normanton Brook from the north. Across the remainder of the study area, the land is generally undulating, with the highest land at up to approximately 200m above Ordnance Datum (AOD) to the north-east of Newton, and the lowest land in the valleys at between 95m and 115m AOD. Slopes are generally shallow with gradients of less than seven degrees in the central part of the study area and steeper in the south, east of Pinxton and South Normanton where they exceed seven degrees, and in the north, west of Huthwaite, where they exceed 11 degrees.

4.3.5 Land at risk of flooding by rivers is confined to the channels of Maghole Brook, Normanton Brook and Nunn Brook. This land is classed as predominantly Flood Zone 2[31], in which there is between a 1-in-100 and 1-in-1000 annual probability of flooding, with some land on the immediate floodplains classed as Flood Zone 3. Further details are provided in Section 15, Water resources and flood risk.

Description and distribution of soil types

4.3.6 The broad characteristics of the soils likely to be present in the study area are described by the Soil Survey of England and Wales[32] and their general distribution is shown on the National Soil Map[33]. Soils possessing similar characteristics are amalgamated into associations.

4.3.7 The presence of each group of soils has been confirmed in parts of the study area by published survey data[34]. The most prevalent group comprises the Bardsey association which is present throughout the study area, and has been identified in a detailed survey undertaken to the east of South Normanton. These soils develop in Carboniferous mudstone and comprise clay loam or sandy clay loam topsoils over clay

[30] British Geological Survey (2018). *Geology of Britain viewer*. Available online at: http://mapapps.bgs.ac.uk/geologyofbritain/home.html
[31] Environment Agency (undated) *Flood map for planning.* Available online at: https://flood-map-for-planning.service.gov.uk/confirm-location?easting=438808&northing=421944&placeOrPostcode=normanton
[32] 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.
[33] Cranfield University (2001), *The National Soil Map of England and Wales 1:250,000 scale.* Cranfield University: National Soil Resources Institute.
[34] MAFF (1997). Ashfield District Local Plan Site Se 2, Pinxton Lane, Sutton in Ashfield. Job No 31/97.

or silty clay subsoils. Profiles are imperfectly to poorly drained, of Wetness Class[35] (WC) III or IV.

4.3.8 The second most prevalent group comprises soils of the Rivington 1 association which are mapped west of Huthwaite. The association develops in outcrops of coal measures and comprises sandy loam or sandy silt loam topsoil overlying sandstone or extremely stony sandy loam. Profiles are well-drained, of WC I, and affected by droughtiness[36].

4.3.9 The least prevalent group comprises soils of the Aberford association which are mapped to the north of Huthwaite. These are typically well drained (WC I), fine loamy profiles overlying limestone, an outcrop of which is mapped to the east of the study area. Profiles become increasingly stony with depth, reaching bedrock at around 40 to 50cm depth, which can result in a slight droughtiness limitation.

Soil and land use interactions

Agricultural land quality

4.3.10 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.

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

4.3.12 The combination of rainfall and accumulated temperature limits agricultural land quality to no higher than Grade 2 in the centre and north of the study area, irrespective of site and soil properties. The interactions of climate with soil characteristics are also important in determining the wetness and droughtiness limitations of the land.

4.3.13 The local agro-climatic data have been interpolated from the Meteorological Office's standard 5km grid point dataset[37] for three points within the study area. The data show climate in the area to be moderately moist with cold to cool temperatures. The number of Field Capacity Days[38] (FCDs), when the moisture deficit[39] is zero, ranges from 171 to 174 days per annum which 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.

[35] The wetness class of a soil is classified according to the depth and duration of waterlogging in the soil profile and has six categories from WC I which is well drained to WC VI which is very poorly drained.
[36] 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
[37] Meteorological Office (1989), *Gridpoint Meteorological data for Agricultural Land Classification of England and Wales and other Climatological Investigations*.
[38] 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.
[39] 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.

4.3.14 Site factors include gradient and flood risk, which affect agricultural land quality in some places throughout this study area. Gradients are limiting to agricultural land quality to the east of South Normanton and west of Huthwaite. Gradients exceeding 11 degrees limit land to Grade 4, whilst gradients of between 7 and 11 degrees result in a limitation to Subgrade 3b. Flood risk is also likely to affect agricultural land quality within the valleys of Normanton Brook and Maghole Brook, limiting agricultural land quality to Subgrade 3b. Further details are provided in Section 15, Water resources and flood risk.

4.3.15 The main physical limitations that result from interactions between soil, climate and site factors are soil wetness, soil droughtiness and a potential localised susceptibility to erosion (where sandier soils are present, particularly on slopes). 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 deficits.

4.3.16 Soils of the Bardsey association, comprising imperfectly or poorly drained, loamy over clayey soils, are affected by wetness and workability. In profiles of WC III with medium loamy topsoils, the limitation is to Subgrade 3a. Profiles which include heavy loam topsoils, and all profiles of this type of WC IV, are of Subgrade 3b.

4.3.17 Detailed ALC survey data at Pinxton identified this soil type and confirms the limitation to Subgrade 3b. Topsoils are of heavy clay loam or silty clay loam and overlie similar upper subsoil horizons which are distinctly mottled. The profiles pass to clay at depth. Coarse structures in all of the subsoil horizons result in poor permeability immediately beneath the topsoil, and the profiles are of WC IV.

4.3.18 A soil type intermediate to the Bardsey and Rivington 1 associations was also identified in the survey. The soils comprise medium clay loam or occasionally heavy clay loam topsoils over similar or sandy clay loam subsoils. Medium sandy loam or clay loam lower subsoil horizons show some mottling, and occasionally sandstone was found at depth. These profiles are of WC I or II and therefore most affected by the overriding climatic limitation and classified as Grade 2.

4.3.19 Coarse loamy profiles of the Rivington 1 association are freely draining and affected by droughtiness. The severity of any droughtiness limitation is determined by factors such as topsoil texture, stone content and depth to the sandstone bedrock. As moisture deficits are moderate to moderately small, droughtiness limitations are mostly slight to Grade 2, although Subgrade 3a land may occur where sand and sandstone lower horizons are present at shallow depths.

4.3.20 Fine loamy soils of the Aberford association are typically well drained and easy to work. Profiles are most likely to be limited slightly by droughtiness, as well as the climatic limitation, to Grade 2.

4.3.21 The Rivington 1 and Aberford soils may also occur in areas in where a topographic limitation is more significant.

4.3.22 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[40] shows that there is a moderate likelihood of encountering BMV agricultural land in the locality, which makes such land a resource of medium sensitivity in this study area.

4.3.23 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

4.3.24 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[41] and the Government's White Paper, The Natural Choice: securing the value of nature[42], and include:

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

4.3.25 Forestry resources represent a potentially multifunctional source of productive timber, landscape amenity, biodiversity and carbon storage capacity. An assessment of the value and sensitivity of woodland resources is reported in Section 7, Ecology and biodiversity, and Section 11, Landscape and visual.

4.3.26 The floodplains of Normanton Brook, Maghole Brook and Nunn 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.

[40] Department of Environment, Food and Rural Affairs (Defra) (2005), *Likelihood of Best and Most Versatile Agricultural Land*. Available online at: http://publications.naturalengland.org.uk/file/5955660136579072
[41] Department for Environment, Food and Rural Affairs (Defra) (2009) *Soil Strategy for England.*
[42] Department for Environment, Food and Rural Affairs (Defra) (2011), *The Natural Choice: securing the value of nature.*

Land use

Land use description

4.3.27 Agricultural land in this study area is used predominantly for traditional mixed arable and livestock enterprises. There are some smaller equestrian holdings found around the fringes of South Normanton and around Newton. The fields are generally of a medium size and are regular in shape, reflecting the size of the associated farm holdings.

4.3.28 Woodland is limited mostly to small areas to the east of Hilcote and alongside Normanton Brook, and a small copse to the east of Red Barn Farm in the north of the study area. None of the woodland is known to be commercially managed.

4.3.29 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.

4.3.30 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.

4.3.31 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. The higher tier and mid-tier options in the CSS are more focussed than Environmental Stewardship, with applications for funding being competitive and the area covered by the scheme 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. There are very few agri-environment schemes in this study area, as identified in Table 12.

Number, type and size of holdings

4.3.32 Table 12 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.

4.3.33 Table 12 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.

Table 12: Summary of characteristics of holdings

Holding name	Holding type	Holding size (ha)	Diversification	Agri-environment scheme	Sensitivity to change
Brookhill Hall Farm*	Dairy	70	Not known	None	High
Crow Trees Farm*	Arable	30	Solar park	None	Medium
Land south of A38 Alfreton Road*	Grazing	10	None	None	Low
Hobsic Farm	Arable and beef cattle	72	Wind turbine, DIY livery, contracting	None	Medium
Wincobank Farm*	Equestrian	3	None	None	Medium
Twinyards Farm	Arable and beef cattle	190	Wind turbine, solar park, commercial storage lets	None	Medium
Yew Tree Farm*	Sheep	12	Not known	None	Medium
Longside Cottage Farm*	Grassland	6	Not known	None	Medium
Newtonwood Lodge Farm*	Equestrian and arable	56	Not known	ELS	Medium
Land west of New Lane*	Grazing	3	Not known	None	Low
Pipes Farm*	Equestrian	5	Not known	None	Medium
Three Lane End Farm*	Beef cattle	10	Not known	None	Medium
Land south-east of Alfreton Road*	Grazing	3	None	None	Low
Hall Farm*	Arable	15	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)[43] 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 (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, a farm accommodation access realignment at Newtonwood Lodge Farm (see Volume 2: Map CT05-450a, sheet 9,

[43] Supporting document: Draft Code of Construction Practice

H7-I7) has been incorporated at this stage to avoid or mitigate adverse impacts on agriculture, forestry or soils.

4.4.4 The effect of severance of agricultural land would be reduced by the realignment and re-instatement of public highways and Public Rights of Way in this study area, and by the opportunity for agricultural access beneath the Normanton Brook east viaduct to enable access across the HS2 main line for Twinyards Farm. The requirement for agricultural access to severed land parcels will continue to be assessed as part of the development of the design.

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.

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 show that the Proposed Scheme is likely to require approximately 220ha of agricultural land within the Pinxton to Newton and

Huthwaite area during the construction phase, of which approximately 60ha (27%) is likely to be classified as BMV land (Grades 2 and 3a). This is a medium magnitude of impact on BMV land.

4.4.10 As BMV land in this study area is a receptor of medium sensitivity, it is currently expected 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[44]. These principles would be followed throughout the construction period.

4.4.14 Clayey and seasonally waterlogged soils of the Bardsey 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.

[44] Department for Environment, Food and Rural Affairs (Defra) (2009) *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites.*

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 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 13 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 13: Summary of temporary effects on holdings from construction

Holding name/ Sensitivity to change	**Land potentially required**	**Potential severance impact**	**Potential scale of effect**
Brookhill Hall Farm High sensitivity	High	Medium	Major adverse
Crow Trees Farm Medium sensitivity	Medium	Negligible	Moderate adverse
Land south of A38 Alfreton Road Low sensitivity	High	Negligible	Moderate adverse
Hobsic Farm Medium sensitivity	Low	Negligible	Minor adverse
Wincobank Farm Medium sensitivity	High	Negligible	Major/moderate adverse
Twinyards Farm Medium sensitivity	High	High	Major/moderate adverse
Yew Tree Farm Medium sensitivity	High	Medium	Major/moderate adverse
Longside Cottage Farm Medium sensitivity	High	Negligible	Major/moderate adverse
Newtonwood Lodge Farm Medium sensitivity	High	Medium	Major/moderate adverse

Holding name/ Sensitivity to change	Land potentially required	Potential severance impact	Potential scale of effect
Land west of B6406 New Lane Low sensitivity	High	Negligible	Moderate adverse
Pipes Farm Medium sensitivity	High	Medium	Major/moderate adverse
Three Lanes End Farm Medium sensitivity	High	Negligible	Major/moderate adverse
Land south-east of Alfreton Road Low sensitivity	High	Negligible	Moderate adverse
Hall Farm Medium sensitivity	High	High	Major/moderate adverse

4.4.20 Overall, the construction of the Proposed Scheme would potentially affect 14 holdings in the Pinxton to Newton and Huthwaite area temporarily. On the basis of information currently available, 13 of the identified holdings would be likely to experience moderate, major/moderate or major adverse temporary effects from construction, which would be significant for each holding.

4.4.21 Brookhill Hall Farm is expected to experience a major adverse temporary effect during the construction of the Proposed Scheme due to the high proportion of land required from a dairy unit which is of high sensitivity to change.

4.4.22 Eight farms are expected to experience major/moderate adverse temporary effects due to the proportion of land required for the Proposed Scheme and also, in the case of Twinyards Farm and Hall Farm, high severance impacts. Three farms are expected to experience moderate adverse effects, all due to high proportions of land required on low sensitivity holdings.

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 show that the Proposed Scheme is likely to require approximately 100ha of agricultural land permanently within the Pinxton to Newton and Huthwaite area, of which approximately 30ha (30%) are likely to be classified as BMV land (Grades 2 and 3a). This is a medium magnitude of impact on BMV land.

4.4.25 As BMV land in this local area is a receptor of medium sensitivity, it is currently expected 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 Two main blocks of woodland, one at Hilcote and one to the east of Red Barn Farm, would be affected by the Proposed Scheme. Neither of these woodlands is known to be commercially managed. The effects on forestry land will be reported in the formal ES. The qualitative assessment of loss of woodland is presented in Section 7, Ecology and biodiversity.

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 14 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 14: 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
Brookhill Hall Farm High sensitivity	High	Medium	High	Major adverse
Crow Trees Farm Medium sensitivity	Negligible	Medium	High	Major/moderate adverse
Land south of A38 Alfreton Road Low sensitivity	High	Negligible	Negligible	Moderate adverse
Hobsic Farm Medium sensitivity	Low	Negligible	Negligible	Minor adverse
Wincobank Farm Medium sensitivity	High	Negligible	High	Major/moderate adverse
Twinyards Farm Medium sensitivity	Medium	High	High	Major/moderate adverse
Yew Tree Farm Medium sensitivity	High	Medium	High	Major/moderate adverse
Longside Cottage Farm Medium sensitivity	Medium	Negligible	High	Major/moderate adverse
Newtonwood Lodge Farm Medium sensitivity	Medium	Medium	Low	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 B6406 New Lane Low sensitivity	High	Negligible	High	Moderate adverse
Pipes Farm Medium sensitivity	Medium	Medium	Low	Major/moderate adverse
Three Lanes End Farm Medium sensitivity	High	Medium	Low	Major/moderate adverse
Land south-east of Alfreton Road Low sensitivity	High	Negligible	Low	Moderate adverse
Hall Farm Medium sensitivity	Medium	High	Low	Major/moderate adverse

4.4.29 Overall, the construction of the Proposed Scheme would potentially affect 14 holdings in the Pinxton to Newton and Huthwaite area permanently. On the basis of information currently available, 13 would be likely to experience moderate, major/moderate or major adverse permanent effects from construction, which would be significant for each holding.

4.4.30 Brookhill Hall Farm would experience a major adverse permanent effect due to the proportion of land required and the impact on farm infrastructure. Eight farms would experience major/moderate adverse permanent effects due mostly to the proportion of land required for the Proposed Scheme but also, in the cases of Crow Trees Farm, Wincobank Farm, Twinyards Farm, Yew Tree Farm, Longside Cottage Farm and land west of B6406 New Lane, due to the high impacts on farm infrastructure. At Twinyards Farm, this includes renewable energy infrastructure, particularly the wind turbine and solar park.

4.4.31 Four holdings would experience moderate adverse permanent effects, mostly due to high land requirements on low sensitivity holdings.

4.4.32 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

4.4.33 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.

4.4.34 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

4.4.35 Although the extent of land required permanently by ALC grade is not yet known in the Pinxton to Newton and Huthwaite area, current indications based on publicly available information are that the temporary and permanent effects on BMV agricultural land during and following construction would be moderate adverse, which would be significant. The amount of land required by ALC grade will be assessed and reported in the formal ES.

4.4.36 Thirteen of the 14 identified farm holdings are expected to experience moderate, major/moderate or major adverse temporary effects during construction and permanent effects from construction, which would be significant for each holding.

4.4.37 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 The potential for significant effects on sensitive livestock receptors from noise will be assessed and reported in the formal ES.

4.5.4 Five sets of farm buildings at Brookhill Hall Farm, Yew Tree Farm, Newtonwood Lodge Farm, Pipes Farm and Three Lanes End Farm lie 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.

4.5.5 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.

4.5.6 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

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

Summary of likely residual significant effects

4.5.8 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

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

4.5.10 There are no area-specific requirements identified for monitoring agriculture, forestry and soil during the operation of the Proposed Scheme in the Pinxton to Newton and Huthwaite 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 Pinxton to Newton and Huthwaite area. Oxides of nitrogen (NOx) including nitrogen dioxide (NO_2), fine particulate matter[45] (PM_{10}, $PM_{2.5}$) 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 Ashfield District Council (ADC) has commenced and is ongoing. 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 can be found in the Volume 2: LA08 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, Section 8 and the Scope and Methodology Report (SMR)[46].

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[47]:

- 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.

[45] $PM_{2.5}$ and PM_{10} 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.
[46] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report
[47] 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.

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 (2023-2032). The assessment will assume vehicle emission rates and background pollutant concentrations from 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 Pinxton to Newton and Huthwaite area are emissions from road vehicles and agricultural activities. The main roads within the area are the M1, the A38 Trunk Road, the A38 Alfreton Road, the B6018 Mansfield Road/Park Lane, the B6019 Mansfield Road/Pinxton Lane/Alfreton Road/Town Street/Pinxton Green, the B6406 New Lane/Berristow Lane, the B6026 Cragg Lane/Huthwaite Lane, the B6027 Common Road and Brookhill Lane.

5.3.2 There are two industrial installations (regulated by the Environment Agency) with permits for emissions to air, namely Nottingham Zinc Group and Acorn Surface Technology, both installations carry out surface treatment activities for metals and plastics. The contribution of all industrial processes and other emission sources to local air quality is 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)[48] 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 Pinxton to Newton and Huthwaite area.

Local monitoring data

5.3.4 There are currently 16 local authority diffusion tube sites located within the Pinxton to Newton and Huthwaite area for monitoring NO2 concentrations. Measured concentrations in 2016 were within the air quality standard[49].

Air quality management areas

5.3.5 There is one air quality management area (AQMA) within the Pinxton to Newton and Huthwaite area, the South Normanton AQMA. This AQMA covers 12 properties on Carter Lane East, close to the slip road and carriageway of junction 28 of the M1, and was declared in July 2004. The AQMA was designated for exceedances in the annual mean NO2 standard.

[48] Department for Environment, Food and Rural Affairs (Defra) Defra Background Pollutant Concentration Maps; http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015
[49] At the time of assessment, measurements for 2016 were the latest published annual monitoring baseline data.

Receptors

5.3.6 Several locations have been identified in the area as sensitive receptors, which 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. Other receptors include various schools and businesses.

5.3.8 There are no statutory designated ecological sites identified within the Pinxton to Newton and Huthwaite area. Other non-statutory sensitive ecological sites identified close to the Proposed Scheme include Maghole Brook and Ashfield District Dumble Local Wildlife Site (LWS), Hucknall Disused Railways LWS, New Hucknall Sidings Grasslands LWS, Blackwell Road Grassland LWS, Spring Farm Pasture, Huthwaite LWS and Spring Farm Meadows 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)[50]. 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;

[50] Supporting document: Draft Code of Construction Practice

- 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 of earthworks.

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.

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[51] have been assessed for their effect on dust soiling, human health[52] and ecological sites. There are residential and ecological receptors located within the Pinxton to Newton and Huthwaite area.

5.4.6 For demolition, the risk of dust and human health effects would range from negligible to medium within this area, depending on the location of sensitive receptors and the magnitude of the demolition activities. For earthworks and construction, there would be a medium to high risk of dust effects and a low to medium risk of human health effects. For trackout, there would be a medium to high risk of dust effects and a low risk of human health effects. There would also be a negligible to low 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 the risks associated with the 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 M1, A38 Alfreton Road, the A38 Trunk Road, the B6027 Common Road, the B6026 Huthwaite Lane, the B6406 Berristow Lane, the B6019 Mansfield Road/Pinxton Lane/Alfreton Road/Town Street/Pinxton Green, the B6026 Cragg Lane, Nunn Brook Road, Brookhill Lane/Pinxton Lane, Farmwell Lane, Export Drive, Beaufit Lane and Station Road would likely provide the primary access for construction vehicles in this

[51] 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.
[52] Human health effects relate mainly to short-term exposure to particles of size between 2.5µm to 10µm, measured as PM10.

area. An increase in traffic flows as a result of construction traffic, temporary closures or diversions is anticipated on these roads and the B6406 New Lane. 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 within 200m of construction routes. These will include human receptors and those ecological habitats considered to be sensitive to changes in air quality. These effects will be reported in the formal ES.

Permanent effects

5.4.11 No permanent effects on local air quality are 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 are proposed to address the 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 those 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 Pinxton to Newton and Huthwaite area.

6.1.2 The assessment draws on information gathered from engagement with the users and operators of facilities including Derbyshire County Council (DCC), Derby and Derbyshire Local Access Forum, South Derbyshire District Council (SDDC), Ashfield District Council (ADC), Bolsover District Council (BDC), Pinxton Parish Council (PPC) and Newton/Blackwell Community 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: LA08 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)[53].

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) (public footpaths and bridleways) 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

[53] 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 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 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 Proposed Scheme through the Pinxton to Newton and Huthwaite area would comprise two sections of the route of the Proposed Scheme: one approximately 4.6km in length (referred to as the HS2 main line) and a second section (referred to as the Sheffield spur) approximately 3.1km in length. The area falls within the local authority areas BDC and ADC. The HS2 main line would extend from Pinxton in the south, passing close to the settlements of South Normanton, Hilcote and Huthwaite in the north. The Sheffield spur diverges north-west from the HS2 main line at a location to the east of South Normanton passing close to the settlements of Hilcote, Blackwell and Newton in the north-west.

6.3.2 The Pinxton to Newton and Huthwaite area is both rural and urban in character with agriculture, large commercial warehousing and industrial estates being the main land

uses. The main concentration of community facilities is in the larger settlements of Pinxton and South Normanton.

Pinxton and South Normanton

6.3.3 This area covers the villages of Pinxton and South Normanton.

6.3.4 The village of Pinxton is located west of the HS2 main line and junction 28 of the M1. The village comprises approximately 1,950 residential properties. The nearest residential properties would be located approximately 450m to the west of the HS2 main line. This area also includes scattered residential properties some of which would be on the HS2 main line.

6.3.5 Pinxton provides a range of community resources, including a GP surgery, a pharmacy, a post office and the John King Workshop Museum. Pinxton Community Youth Centre and St. Helens Church provide community space. Places of worship within the study area comprise St Helens Church and Town Street Methodist Church. There are also numerous shops and a public house. Recreational facilities within this area include playing fields and children's play area off Wharf Road. There are two infant schools and a junior school in Pinxton; these are outside the study area.

6.3.6 The village of South Normanton is located west of the HS2 main line and junction 28 of the M1. The village comprises approximately 4,900 residential properties. The nearest residential properties would be located approximately 35m west of the HS2 main line. South Normanton is a village located approximately 1km to the north-west of Pinxton; the two villages are connected by the B6019 Alfreton Road.

6.3.7 South Normanton provides numerous community resources, including educational facilities such as the South Normanton Nursery School, the Green Infant School, Brigg Infant School, Glebe Junior School and Frederick Gent Comprehensive School. Community space is provided by the Post Mill Centre, St. Michael & All Angels Church and the Junction 28 Church. There are numerous shops, public houses and restaurants. There are also several areas of recreational open space, including Hamlet Lane Playing Fields.

Hilcote

6.3.8 The village of Hilcote is located south of the Sheffield spur. The village comprises approximately 320 residential properties. The nearest residential properties would be located approximately 45m south of the Sheffield spur. East of Hilcote, the Sheffield spur would diverge from the HS2 main line in a north-west direction towards Blackwell and Newton, whilst the HS2 main line would continue north towards Huthwaite.

6.3.9 Hilcote has a shop which serves as a post office, general store and off-licence. Hilcote also has a Methodist church and a care home. Areas of open space and recreation within the area include the Blackwell Trail and Hilcote Royal Oak Meadow and Woodlands. The Blackwell Trail is a 2.5km stretch of multi-user trail for walkers, cyclists and horse riders located on the southern edge of the settlement. The Blackwell Trail connects Hilcote to the village to Huthwaite. The Hilcote Royal Oak Meadow and Woodlands is on the northern edge of Hilcote. This is an area of open

space currently being converted into a nature reserve by the Hilcote Environmental Leisure Project (HELP). The village also has three public houses.

Huthwaite

6.3.10 The village of Huthwaite is located east of the HS2 main line. The village comprises approximately 150 residential properties. The nearest residential properties would be located approximately 250m east of the route of the HS2 main line. Huthwaite lies approximately 1km to the east of the M1 at its closest point.

6.3.11 Community resources within the study area include a medical centre and a post office. All Saints Church and Centre provides a place of worship and community space. Recreational facilities within the study area comprise Woodend Farm complex which offers fishing and target sports facilities. Further community resources within the area include public houses and restaurants.

6.3.12 Brierley Golf Course and Forest Country Park, part of Greenwood Community Forest, are located to the north of the village. The Silverhill Trail and linked Five Pits Trail (including part of National Cycle Route (NCN) route 67) is a 7km former mineral railway that provides opportunities for walking, cycling and horse riding. It is located to the north of Huthwaite and provides connectivity to Newton and access across the M1 corridor, west of the route of the HS2 main line.

Newton, Blackwell and surrounds

6.3.13 This area covers the villages of Newton, Blackwell and Old Blackwell. The Sheffield spur would pass between Blackwell and Newton.

6.3.14 Blackwell and Old Blackwell comprise approximately 430 residential properties. Old Blackwell is located approximately 750m east of Blackwell and is linked initially by Hilcote Lane and then Church Hill (a local road). The nearest residential properties within Blackwell would be located approximately 500m south-west of the Sheffield spur. The nearest residential properties within Old Blackwell would be located on the route of the Sheffield spur.

6.3.15 Blackwell village offers community resources which include Blackwell Medical Centre, Blackwell Pharmacy, Blackwell Care Home and Amberleigh Manor Care Home. It also contains Blackwell Children's Centre and Tiny Tots Day Nursery, Blackwell Primary School, Blackwell Methodist Church, and Blackwell Miners' Welfare Social Club. Primrose Hill Playing Fields and Gloves Lane Playing Field provide sports and recreational facilities for the community. Alfreton Road and B6026 Cragg Lane connect the two villages to Newton, where a larger range of community resources is available.

6.3.16 The village of Newton is north of the Sheffield Spur and west of the HS2 main line. The village comprises approximately 690 residential properties. Some residential properties would be on the route of the Sheffield spur. Newton is connected to Blackwell via Alfreton Road.

6.3.17 Community resources within Newton include a post office, Newton Community Centre, Newton Primary School and Newton Nursery, Newton Methodist Church Fellowship, and Sherwood Street Social Club. Newton has areas of recreational open

spaces including allotments, playing fields and the Silverhill Trail and linking Five Pits Trail (which are also used by including part of NCN route 67). The Silverhill Trail and linking Five Pits Trail (including part of NCN route 67) are located to the north of the settlement and provide opportunities for walking, cycling and horse riding. Further community resources include two public houses.

6.4 Effects arising during construction

Avoidance and mitigation measures

6.4.1 The draft Code of Construction Practice (CoCP)[54] 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, 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

6.4.2 No temporary effects on residential properties have been identified as a result of the land required for construction of the Proposed Scheme.

Community facilities

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

[54] Supporting document: Draft Code of Construction Practice

Recreational facilities

6.4.4 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

6.4.5 Construction of Normanton Brook west viaduct, Normanton Brook central viaduct and Normanton Brook east viaduct would result in a temporary diversion of the Blackwell Trail. The duration of the temporary diversion would be approximately two weeks for each viaduct. The trail would be diverted and a protected walkway would be constructed to protect public from overhead works allowing the continued use for its intended purpose without any significant detriment to the users. The temporary diversion is not considered likely to deter cyclists, walkers and other users from using this route for leisure journeys. The temporary diversion of Blackwell Trail would result in a negligible effect, which would not be significant.

6.4.6 Land required for the construction of the Hilcote west embankment would result in temporary loss of approximately 1.1ha of the Hilcote Royal Oak Meadow and Woodlands. This would comprise approximately 35% of this resource, which has a total area of 3.2ha. The duration of this temporary impact would be approximately three years and one month. Hilcote Royal Oak Meadow and Woodlands is an area of open space currently being converted into a nature reserve by HELP. HELP is a community group run by the residents of the village of Hilcote with input from Derbyshire Wildlife Trust. During construction, this resource would be partly compromised as a proportion of the site would be unusable by HELP and members of the public. The temporary loss of part of this open space would result in a moderate adverse effect, which would be significant.

6.4.7 Construction of the Tibshelf cutting and the Silverhill Trail overbridge would result in temporary diversion of the Silverhill Trail (including part of NCN route 67) for approximately one year. On completion of construction, the Silverhill Trail would be permanently realigned vertically to pass over the Silverhill Trail overbridge. During construction the trail would be temporarily diverted 500m to the south allowing the continued use for its intended purpose without any significant detriment to the users. The temporary diversion is not considered likely to deter cyclists, walkers and other users from using this route for leisure journeys. The temporary diversion of Silverhill Trail would result in a negligible effect, which would not be significant.

6.4.8 Land required for construction of the Newton west cutting would result in the temporary loss of approximately 0.1ha of a playing field off South Street in Newton. The duration of this temporary impact would be approximately two years and six months. This would comprise approximately 20% of the playing field off South Street and the loss of pedestrian access. It is assumed that the loss of access to the playing fields would mean that it would not be useable for the duration of construction. Proposed mitigation and an assessment of the likely effects will be reported in the formal ES.

Permanent effects

Residential properties

6.4.9 The land required for the Brookhill Lane embankment would require the demolition of one residential property at Brookhill Lane and one residential property on Pinxton Lane. Both properties are near Pinxton. These residential properties would be permanently lost.

6.4.10 The land required for the Cartwright Lane cutting would require the demolition of two residential properties at Berristow Place in South Normanton. These residential properties would be permanently lost.

6.4.11 The land required for the Hilcote east embankment would require the demolition of one residential property on Huthwaite Lane and one residential property off Blackwell Road. Both properties are to the west of Huthwaite. These residential properties would be permanently lost.

6.4.12 The land required for the Hilcote west embankment would require the demolition of one residential property at Pasture Lane, Hilcote. This residential property would be permanently lost.

6.4.13 The land required for the Newton east cutting would require the demolition of four residential properties on B6026 Cragg Lane and B6026 Huthwaite Lane in Old Blackwell. These residential properties would be permanently lost.

6.4.14 The land required for the Alfreton Road box structure and Newton west cuttings would require the demolition of 18 residential properties on Alfreton Road in Newton. The permanent loss of these properties would result in a major adverse effect, which would be significant.

Community facilities

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

Recreational facilities

6.4.16 No permanent effects on residential properties have been identified as a result of the land required for construction of the Proposed Scheme.

Open space and recreational PRoW

6.4.17 Land required for the Hilcote west embankments and Hilcote cutting would result in the permanent loss of approximately 0.2ha. This would comprise approximately 6% of the Hilcote Royal Oak Meadow and Woodlands, which has a total area of 3.2ha. After construction, the use of this resource as a nature reserve could be retained and users would still be able to use the site. The permanent loss of part of this open space would result in a minor adverse effect, which would not be significant.

6.4.18 Land required for the Tibshelf cutting and Silverhill Trail overbridge would result in the permanent realignment of the Silverhill Trail (including part of NCN route 67). The Silverhill Trail would pass over the HS2 main line on a dedicated overbridge. A change in vertical alignment is not considered likely to deter cyclists, walkers or horse riders

from using this resource. The permanent realignment of Silverhill Trail would result in a negligible effect, which would not be significant.

Other mitigation measures

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

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

Summary of likely residual significant effects

6.4.21 Land required for construction of the Proposed Scheme is likely to result in temporary residual significant adverse effects on Hilcote Royal Oak Meadow and Woodland in Hilcote.

6.4.22 Land required for construction of the Proposed Scheme is likely to result in permanent residual significant adverse effects on residential properties on Alfreton Road in Newton.

Cumulative effects

6.4.23 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.

6.4.24 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 for effects arising from operation 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.

Monitoring

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

6.5.6 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 the Pinxton to Newton and Huthwaite 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, Environment Agency, Nottinghamshire County Council (NCC), Derbyshire County Council (DCC), Derbyshire Wildlife Trust and Nottinghamshire 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: LA08 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)[55].

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.

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

7.3.2 Land required for and adjacent to the Proposed Scheme in this area consists mainly of agricultural land primarily running parallel to, and west of, the M1. The area also includes the watercourses of Maghole Brook and Normanton Brook, urban settlements, and industrial estates, interspersed with small villages and some isolated dwellings and farmsteads. The Sheffield spur would cross the M1.

7.3.3 Statutory and non-statutory designated sites are shown on Map Series CT-10, Volume 2: LA08 Map Book.

Designated sites

7.3.4 There are no internationally important sites relevant to the assessment within the Pinxton to Newton and Huthwaite area.

7.3.5 There are no sites of special scientific interest (SSSI) of potential relevance to the assessment in the Pinxton to Newton and Huthwaite area.

7.3.6 There are 10 local wildlife sites (LWS) of potential relevance to the assessment in the Pinxton to Newton and Huthwaite area, each of which is of county/metropolitan value. Habitats within potential or candidate wildlife sites that are not formally notified are considered within the habitats section below. 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:

- Maghole Brook and Ashfield District Dumble LWS, covering an area of 10ha, is a linear site comprising a stream and dumble[56] with associated woodland and sections of interesting ground flora[57], stretching from west of Pinxton to Sutton-in-Ashfield. The south-western end of the LWS is partially within the land required for the Proposed Scheme, and would be crossed by the Proposed Scheme;
- Franderground Farm Disused Railway LWS covers an area of 3ha and comprises a wooded and disused railway with notable flora57. The LWS is located to the west of Kirkby-in-Ashfield, 200m east of the land required for the Proposed Scheme and connected to Maghole Brook and Ashfield District Dumble LWS;
- Hucknall Disused Railways LWS covers an area of 10ha west of Sutton-in-Ashfield and comprises an ecologically valuable length of disused railway, with a notable and characteristic plant community[57]. The LWS is almost entirely within the land required for the Proposed Scheme;
- New Hucknall Sidings Grasslands LWS covers an area of 3ha west of Sutton-in-Ashfield comprising grassland with notable species[57]. The LWS is entirely

[56] A dumble is term for a wooded valley frequently used in Nottinghamshire and the Midlands. Dumbles are often associated with steep valleys along small watercourses.
[57] Ashfield District Council (2003), *Ashfield Nature Conservation Strategy*. Available at: www.nottinghaminsight.org.uk/d/63692.

within the land required for the Proposed Scheme;

- Hillcote Water Gardens LWS covers an area of 7ha north of South Normanton. The LWS consists of lowland swamp. It has standing open water ponds and a water vole population. The LWS is bisected by the M1 and is 190m north of the land required for the Proposed Scheme within the area of the Sheffield spur;
- Blackwell Road Grassland LWS covers an area of 0.5ha and comprises a notable dry grassland community[57] west of Sutton-in-Ashfield. The LWS is south-east and adjacent to the land required for the Proposed Scheme;
- Sunnyside Farm Meadows LWS covers an area of 3ha comprising a fine sequence of variously wet and dry grasslands[57]. The LWS is west of Sutton-in-Ashfield and is 345m east of the land required for the Proposed Scheme;
- Spring Farm Pasture, Huthwaite LWS covers an area of 0.5ha and comprises a long established and notably species-rich grassland community[57]. The LWS is west of Sutton-in-Ashfield and is within the land required for the Proposed Scheme;
- Spring Farm Meadows, Huthwaite LWS covers an area of 4ha and comprises a sequence of species-rich hay meadows[57]. The LWS is west of Sutton-in-Ashfield and is adjacent to the land required for the Proposed Scheme; and
- Huthwaite Grassland LWS covers an area of 2ha comprising a noteworthy meadow with both dry acid and neutral grassland communities represented within its herb-rich sward[57]. The LWS is west of Huthwaite and is 385m east of the land required for the Proposed Scheme.

7.3.7 There is one Ancient Woodland Inventory Site (AWIS), The Dumbles, relevant to the assessment in this area. Due to the habitat and species present, this site is considered to be up to county/metropolitan value. The Dumbles is 3ha of ancient semi-natural woodland which lies 450m east of the land required for the Proposed Scheme and to the south-west of Sutton-in-Ashfield. This section of woodland links into more woodland habitat that runs on both sides of Maghole Brook and lies within the Maghole Brook and Ashfield District Dumble LWS boundary, the western part of which is within the land required for the Proposed Scheme.

7.3.8 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

7.3.9 The following habitat types that occur in this area are relevant to the assessment.

Woodland

7.3.10 In addition to the woodlands within designated sites and AWIS described above, there are six other areas of deciduous woodland (likely to qualify as habitats of principal

importance[58], and local biodiversity action plan (BAP)[59] habitats), which would be within or partly within the land required for the Proposed Scheme. These include:

- one woodland block along Maghole Brook which connects into woodland along the brook and into The Dumbles AWIS to the east;
- Terrace Wood to the south of Castlewood Business Park to the west of the Proposed Scheme following the line of Normanton Brook;
- two woodlands south-west and west of The County Estate;
- one linear woodland east of Hilcote, east of Cokefield Terrace; and
- one area of woodland north of Red Barn Farm.

7.3.11 On a precautionary basis, pending the findings of field surveys, these woodlands are considered to be of up to county/metropolitan value.

7.3.12 There is one area of wood pasture and parkland habitat at Brookhill Farm to the north-east of Pinxton, which is partly within the land required for the Proposed Scheme. On a precautionary basis, pending the findings of field surveys, this habitat is considered to be of up to district/borough value.

Grassland

7.3.13 Grasslands outside designated sites, which may qualify as a habitat of principal importance and local BAP habitat, occur within the land required for the Proposed Scheme. This includes areas of good quality semi-improved grassland south and west of The County Estate and areas of semi-improved neutral grassland within potential LWS also occur north of Hilcote (1.3ha) and north-west of Longside Cottage Farm (0.72ha). On a precautionary basis, pending the findings of field surveys (which may identify these as unimproved grasslands) these grassland are considered to be of up to county/metropolitan value, and other grasslands are considered to be of up to district/borough value.

Hedgerows

7.3.14 Many of the hedgerows in the area, including hedgerows within the land required for the Proposed Scheme, are likely to qualify as a habitat of principal importance and a local BAP habitat. Some may also meet the wildlife and landscape criteria to be 'important' hedgerows as defined in the Hedgerows Regulations 1997[60]. 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.

[58] Section 41 of the Natural Environment and Rural Communities Act (2006) (c.16). London, Her Majesty's Stationery Office.
[59] Nottinghamshire Biodiversity Action Group (1998) Local Biodiversity Action Plan for Nottinghamshire. Available online at: http://www.nottsbag.org.uk/projects.htm
[60] The Hedgerows Regulations 1997 (SI 1997 No. 1160). London, Her Majesty's Stationery Office.
[60] Wildlife and Countryside Act 1981

Watercourses

7.3.15 The Maghole Brook, Normanton Brook and seven smaller watercourses would be crossed by the Proposed Scheme. Maghole Brook and Normanton Brook may qualify as habitats of principal importance and local BAP habitats. On a precautionary basis, pending the findings of field surveys, Maghole Brook and Normanton Brook are considered to be of up to county/metropolitan value. The smaller watercourses are considered to be of up to district/borough value, pending confirmation through field surveys of their water quality status, species and habitat context.

Water bodies

7.3.16 There are 13 ponds within, or partly within, the land required for the Proposed Scheme. Some ponds may qualify as habitats of principal importance, or local BAP habitats especially if they support flora or fauna species of conservation importance. 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

7.3.17 Pending the results of the field surveys, it is possible that ancient and veteran trees will be present within the land required for the Proposed Scheme. Information on ancient and veteran trees will be confirmed upon further survey and will be reported in the formal ES. On a precautionary basis, pending the findings of field surveys, these trees have been assumed to be of up to district/borough value.

Protected and notable species

7.3.18 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 15.

Table 15: Species potentially relevant to the assessment within the Pinxton to Newton and Huthwaite area

Resource/feature	Value	Rationale
Bats	Up to regional	There are records of bats including common pipistrelle, brown long eared bat, noctule and *Myotis* species within suitable roosting and foraging habitat in the Pinxton to Newton and Huthwaite area and within 500m of land required for the Proposed Scheme. There are pipistrelle roost records at the Old School House in Old Blackwell, less than 10m from the land required for the Proposed Scheme, and also in Hilcote, 185m east of the land required for the Proposed Scheme. There are further bat roost records of common pipistrelle and natterer's bat within 2km of the land required for the Proposed Scheme. Maghole Brook, Normanton Brook and other watercourses are likely to provide foraging and commuting habitat for bats. There are a number of records of foraging and commuting bat species along Maghole Brook and Ashfield District Dumble LWS, The Dumbles and Maghole Brook which are likely to provide linear commuting features for bats and there are existing records of common pipistrelle associated with these sites. Linear woodlands connecting to Hucknall Disused Railways LWS, woodland to the south and south-east of the East Midlands Designer Outlet and a number of ponds in this area may also provide commuting and foraging habitats. Buildings in this area as well as trees (especially those within woodlands)

Resource/feature	Value	Rationale
		are likely to have features suitable for bat roost.
Otter	Up to county/metropolitan	Suitable habitat for otter is present along the watercourses, such as Maghole and Normanton Brooks, drainage ditches and standing water bodies. There are no records of otter from baseline information. Ongoing surveys are assessing habitats for presence of otter.
Water vole	County/metropolitan	Water vole are declining in Nottinghamshire and Derbyshire. Ongoing surveys have recorded water vole on Normanton Brook 50m west of the land required for the Proposed Scheme. Habitat suitable for water vole is present along the watercourses and drainage ditches, and there are historic records (though more than 10 years old) of their presence along the Normanton Brook and its tributaries.
Polecat	Up to county/metropolitan	Habitat suitable for this species is present including hedgerows, farmland and woodland. There are no records of polecat identified through baseline information. Ongoing surveys are assessing habitats for presence of polecat.
Great crested newt	Up to county/metropolitan	There are nine previous records of great crested newt within the vicinity of Normanton Brook, eight of which are in the land required for the Proposed Scheme. There are 13 ponds within the land required for the Proposed Scheme which may have aquatic and surrounding terrestrial habitats suitable to support great crested newts. There are an additional 11 ponds within 250m of the land required for the Proposed Scheme which may have aquatic and surrounding terrestrial habitats suitable to support great crested newts.
Birds	Up to county/metropolitan	The farmland and woodland habitats and small holdings in this area support a variety of breeding and wintering birds. A barn owl (listed on Schedule 1)[61] roost was observed within the land required for the Proposed Scheme during surveys. Wintering bird surveys during 2017/18 recorded a total of 41 species including 11 red-listed Birds of Conservation Concern (BoCC)[62]. Species of note include willow tit, a rapidly declining bird in the UK, at two locations near Huthwaite within 100m of land required for the Proposed Scheme.
White-clawed crayfish	Up to county/metropolitan	White-clawed crayfish are rare in this area and declining. Suitable habitat for this species is likely to be present in Maghole Brook, Normanton Brook and the smaller watercourses; however no records have been identified in this area.
Aquatic invertebrates	Up to district/borough	Suitable habitat for aquatic invertebrates (other than white-clawed crayfish) is likely to be present in watercourses including Maghole Brook, Normanton Brook, and smaller watercourses and in standing water bodies. Ongoing surveys are assessing habitats for presence of aquatic invertebrates as none are present in the baseline information.
Terrestrial invertebrates	Up to district/borough	Suitable habitat for terrestrial invertebrates is likely to occur in areas of woodland, scrub, hedgerows and grassland. There is one record of dingy skipper (a butterfly species of principal

[61] Wildlife and Countryside Act 1981
[62] British Birds (2015) *Birds of Conservation Concern 4*. Available online at: https://britishbirds.co.uk/wp-content/uploads/2014/07/BoCC4.pdf

Resource/feature	Value	Rationale
		importance) from 2007 within the land required for the Proposed Scheme, at Hilcote Tip south of Normanton Brook.
Fish	Up to district/borough	Suitable habitat for fish is present in watercourses including Maghole and Normanton Brooks, as well as the smaller watercourses and water bodies. There are records in Normanton Brook downstream of the land required for the Proposed Scheme of European bullhead (listed on Annex II of the Habitats Directive)[63] and brown trout. There are further records of European bullhead in Maghole Brook.
Reptiles	Up to district/borough	A number of habitats which may support common species of reptiles including slow worm, grass snake and common lizard, are likely to be present along the watercourses, as well as other areas such as grassland habitats within the Pinxton to Newton and Huthwaite area. There is a record from 2015 for grass snake south of Newton within the land required for of the Proposed Scheme. There are three records for grass snake along Normanton Brook, including one within the land required for the Proposed Scheme. However, these are all over 10 years old.

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 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:

- Maghole Brook viaduct over Maghole Brook and Normanton Brook east and Normanton Brook west viaducts over Normanton Brook would avoid direct effects to these watercourses and allow free passage for wildlife beneath them, including along the rivers and their banks;
- provision of wetland habitat creation in the floodplain of the Normanton Brook to enhance and maintain riparian habitat connectivity in the vicinity of the Normanton Brook viaducts;
- new woodland planting (59.9ha) to contribute towards compensating for the losses of woodland and to enhance connectivity between remaining woodlands;
- provision of 31 new ponds (e.g. in the vicinity of Normanton Brook) which would form part of the measures to address the loss of water bodies and effects on great crested newts and other species;
- provision of 5.1km of new species-rich hedgerows, using appropriate native species, to contribute towards compensating for the loss of hedgerows, and re-connecting the ecological network in the surrounding areas, including along

[63] Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora

the margins of the Proposed Scheme; and

- provision of 9.4ha of new grassland habitats, including species-rich grasslands to contribute towards compensating for the losses from the Proposed Scheme (e.g. New Hucknall Sidings Grassland LWS and areas associated with land south of The County Estate).

7.4.2 The assessment assumes implementation of the measures set out within the draft Code of Construction Practice (CoCP)[64], 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 The Proposed Scheme would cross Maghole Brook and Ashfield District Dumble LWS on Maghole Brook viaduct. Pending confirmation of piled viaduct column locations and final design, on a precautionary basis it is assumed that a column would be within the LWS, although not within the watercourse, and this would result in loss of habitat.

[64] Supporting document: Draft Code of Construction Practice

The effects of habitat loss (which could be up to 1ha, or 7% of the LWS across both LA07 and LA08) from viaduct construction would result in the permanent adverse effect on site integrity that would be significant at up to county/metropolitan level.

7.4.6 The construction of the A38 Alfreton Road south cutting, Cartwright Lane cutting, Normanton Brook east embankment and Hilcote east embankment, flood storage area and adjacent attenuation pond would result in the loss of 7.3ha (72.5%) of Hucknall Disused Railways LWS. Habitat loss would result in a permanent adverse effect on site integrity that would be significant at the county/metropolitan level.

7.4.7 Construction of Normanton Brook east embankment and Hilcote east embankment would result in the loss of 2.8ha (94.8%) of New Hucknall Sidings Grasslands LWS. This would result in a permanent adverse effect on site integrity within the majority of the LWS that would be significant at the county/metropolitan level.

7.4.8 Construction of the Hilcote east embankment and adjacent attenuation pond would result in the loss of 0.5ha (100%) of Spring Farm Pasture, Huthwaite LWS. Loss of the entire LWS would result in a permanent adverse effect on site integrity with the loss of the whole LWS that would be significant at the county/metropolitan level.

Habitats

Woodland

7.4.9 As well as woodland within designated sites, construction would result in the loss of 7ha of broadleaved woodland, likely to qualify as a habitat of principal importance, within the land required for the Proposed Scheme. This includes construction of the Cartwright Lane cutting, which would result in woodland loss at Terrace Wood. Construction works for Normanton Brook east, central and west viaducts would result in the loss of woodland surrounding Normanton Brook. This would be a permanent adverse effect that would be significant at up to county/metropolitan level.

7.4.10 Construction of the Brookhill Lane realignment would also result in the loss of a section of Brookhill Hall wood pasture and parkland habitat. Permanent loss of habitat and potential changes to species composition and habitat quality from indirect effects would result in a permanent adverse effect that would be significant at up to district/borough level.

7.4.11 The proposed planting of woodland would, following establishment, help compensate for loss of existing woodland so that the residual effect would be reduced to not significant. However, if the ongoing review identifies the presence of additional ancient woodland the residual effect would be significant at up to county/metropolitan level.

Grassland

7.4.12 In the absence of further survey data, it is considered that the Proposed Scheme would result in the loss of grassland outside designated sites, including 6ha of good quality semi-improved grassland south of The County Estate and 2ha of semi-improved neutral grassland to the north of Hilcote and north-west of Longside Cottage Farm within potential LWS. This is a permanent adverse effect that is significant at up to the county/metropolitan level for grasslands within Kingsbury

Wetlands potential LWS and at district/borough level for other grasslands. Whilst creation of new grassland would provide compensation for habitat losses, until further surveys and assessment are completed, the permanent loss of these grasslands is considered on a precautionary basis to have a residual adverse effect (following establishment of new grassland) that would be significant at up to district/borough level.

Hedgerows

7.4.13 The Proposed Scheme would cross hedgerows in the Pinxton to Newton and Huthwaite area, some of which may be 'important' hedgerows[65]. The land required for the Proposed Scheme would result in the loss of 20km[66] of hedgerows, and would result in severance of the network in many places, adversely affecting connectivity with the surrounding area. The Proposed Scheme includes new hedgerow planting which would help compensate for the losses. Further hedgerow habitat creation 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 district/borough level.

Watercourses

7.4.14 The Proposed Scheme would cross the Maghole Brook and Normanton Brook on viaducts. These watercourses would not be directly affected, and indirect effects would not be significant as they would be controlled through the implementation of measures in the draft CoCP. However, the Proposed Scheme would result in the severance of river corridors of sections of five smaller watercourses due to culverts. This would result in a permanent adverse effect that would be significant at up to district/borough level.

Water bodies

7.4.15 It is expected that 13 ponds would be lost as a result of the Proposed Scheme and associated temporary works. Indirect effects from hydrological changes to surface and ground water, especially in areas of cutting, has the potential to affect additional water bodies. These losses would be a permanent adverse effect that is significant at up to the county/metropolitan level. Replacement ponds are to be created, for example in the vicinity of Normanton Brook, which would compensate for habitat losses. On a precautionary basis, pending further survey information and assessment, it is considered that the residual adverse effect would be significant at up to district/borough level, particularly if it is confirmed through field surveys that these ponds support species of high conservation importance.

Ancient and veteran trees

7.4.16 It is assumed that any ancient and veteran trees within the land required for the Proposed Scheme in the Pinxton to Newton and Huthwaite area would be

[65] The Hedgerow Regulations 1997
[66] This figure will be refined in the formal ES.

permanently lost. Ancient and veteran trees are an irreplaceable resource and their potential loss would result in a permanent adverse effect that would be significant at district/borough level in each case.

Species

Bats

7.4.17 There are at least five species of bat recorded in the Pinxton to Newton and Huthwaite area. The demolition of buildings/structures and the permanent removal or disturbance of habitat features that are utilised by bats during breeding, hibernation or migrating between roosts could result in adverse effects on bat populations and assemblages. Habitat loss would reduce the availability of foraging resource, and potentially result in the loss of roosts and fragmentation of commuting routes. The Proposed Scheme would result in the loss and/or severance of hedgerows and some areas of woodland habitat including Terrace Wood and at Hucknall Disused Railways LWS, potentially affecting foraging and commuting routes. The former area is already severed to some extent by the M1. Other potential key areas of habitat could include Maghole Brook and Normanton Brook, Maghole Brook and Ashfield District Dumble LWS, crossed by viaducts. This could particularly affect breeding populations of bat species present within the Pinxton to Newton and Huthwaite area. Bats may also be affected by the lighting associated with construction works, although it is anticipated that this would be controlled through measures in the draft CoCP.

7.4.18 The proposed woodland, grassland and hedgerow planting will help to reduce impacts to bats and further mitigation will be identified following ongoing surveys and assessment. 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.

Otter

7.4.19 Habitat suitable for otter is present along the watercourses, drainage ditches and ponds in the Pinxton to Newton and Huthwaite area. The proposed viaducts over Maghole Brook and Normanton Brook would avoid significant loss of habitat, potentially including resting and foraging sites, along the river corridors. While there is potential for otter to be disturbed and displaced by construction activities, it is likely that significant effects would be avoided through measures in the draft CoCP. Habitat loss would occur at several smaller watercourses and ponds within the land required for the Proposed Scheme. On a precautionary basis, in the absence of survey information, impacts to otters would result in an adverse effect on the conservation status of these species that would be significant at up to county/metropolitan level.

Water vole

7.4.20 Water voles have been recorded in the Normanton Brook catchment within 50m, west of the land required for the Proposed Scheme. The proposed viaducts over Maghole Brook and Normanton Brook would avoid loss of habitat along the watercourse corridors. While there is potential for water vole to be disturbed and displaced by construction activities, it is likely that significant effects would be avoided through

measures in the draft CoCP. Habitat loss and fragmentation would result at the smaller watercourses crossed by the Proposed Scheme. On a precautionary basis, in the absence of further survey information, impacts to water vole would result in an adverse effect on the conservation status of this species that would be significant at up to county/metropolitan level.

Polecat

7.4.21 The loss and fragmentation of habitats such as grassland and arable land could affect polecat if surveys show this species to be present. Should polecat be confirmed to be present, the effects of habitat loss on these species would be significant at up to county/metropolitan level.

Great crested newt

7.4.22 On a precautionary basis and in the absence of survey results, it has been assumed that all 13 ponds (and surrounding terrestrial habitat) within the land required for the Proposed Scheme may support great crested newts, and would be lost during construction.

7.4.23 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 newts are present, two new ponds will be created for every one lost to the permanent works, and this would contribute towards reducing the effects to not significant. Habitat creation within the Proposed Scheme design includes ponds together with associated terrestrial habitat within the land required for the Proposed Scheme. Suitable terrestrial habitat would be required around all new ponds created along with links to encourage dispersal (e.g. by incorporating existing habitat or creating new habitat), and this would require further development. On a precautionary basis, pending further surveys and information on construction phasing, 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

7.4.24 The Proposed Scheme would result in the loss and fragmentation of nesting and foraging habitat for a range of breeding and wintering birds, predominantly farmland and woodland species. These include notable species such as barn owl (Schedule 1) and willow tit (BoCC red-listed), both of which have been recorded in the Pinxton to Newton and Huthwaite area. On a precautionary basis, in the absence of further survey information, it is considered that the Proposed Scheme would result in a permanent adverse effect on breeding and wintering birds that would be significant at up to the county/metropolitan level.

White-clawed crayfish

7.4.25 No records of white-clawed crayfish have been identified in this area; however, there is the potential for this species to occur in watercourses including Maghole Brook, Normanton Brook and their tributaries. It is expected that white-clawed crayfish will not be present in the minor watercourses and land drains to be culverted beneath the Proposed Scheme. However, in the absence of survey information, this species is

assumed to be present in the watercourses named above, and there would be an adverse effect that would be significant at up to county/metropolitan level.

Aquatic invertebrates

7.4.26 The land required for the Proposed Scheme would result in loss of habitat suitable for aquatic invertebrates within both large and small watercourses, such as Maghole Brook (including species of principal importance)[67]. On a precautionary basis, in the absence of further survey information, it is considered that Proposed Scheme would result in a permanent adverse effect that would be significant at up to district/borough level.

Terrestrial invertebrates

7.4.27 The land required for the Proposed Scheme would result in loss of habitat suitable for terrestrial invertebrates (including species of principal importance). There is a record for dingy skipper (a butterfly species of principal importance) within the land required for the Proposed Scheme. On a precautionary basis, in the absence of survey information, it is considered that the Proposed Scheme would result in a permanent adverse effect that would be significant at up to district/borough level.

Fish

7.4.28 There are records of fish from the main watercourse catchments including species such as European bullhead (listed on Annex II of the EC Habitats Directive[68]) and brown trout. The Proposed Scheme would pass over Maghole Brook and Normanton Brook on viaducts, and indirect effects to the watercourses would be controlled through measures set out in the draft CoCP. However, other smaller watercourses would still be affected through habitat loss and may require assessment under the Water Framework Directive (WFD)[69]. On a precautionary basis, in the absence of survey information, it is considered that the Proposed Scheme would result in a permanent adverse effect on the minor watercourses that would be significant at up to district/borough level.

Reptiles

7.4.29 There are records of common reptiles within 2km of the land required for the Proposed Scheme. Suitable habitat is likely to be present for reptiles within the land required for the Proposed Scheme, including grassland scrub, hedgerows and field margins, and along Normanton Brook, where there are records of grass snake. The Proposed Scheme would result in the loss of habitat suitable for reptiles. On a precautionary basis in the absence of survey information, it is considered that the loss of potential reptile habitat within the land required for the Proposed Scheme would result in a permanent adverse effect that would be significant at up to district/borough level.

[67] Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 - Habitats and Species of Principal Importance in England
[68] Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora
[69] Council Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy. Available online at: http://ec.europa.eu/environemt/water/water-framework/index_en.html

7.4.30 Effects on all other habitats and species would be likely to be significant at the local/parish level during construction. These effects will be reported in the formal ES.

7.4.31 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

7.4.32 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:

- provision of additional broadleaved woodland to replace woodland habitat lost, and/or enhancement of remaining woodlands;
- options to modify construction areas and attenuation ponds locally to reduce direct impacts to Local Wildlife Sites and priority habitats;
- potential habitat creation in the replacement floodplain storage areas in the floodplains of Maghole Brook and Normanton Brook;
- provision of additional hedgerows which would compensate the losses and maintain the connectivity of the network;
- options to create additional species-rich grasslands (including translocation where appropriate) to compensate for grassland losses including within and adjacent to Spring Farm Pasture LWS, the grassland south of The County Estate and the Hucknall Disused Railways LWS, and to compensate for losses of good quality semi-improved grassland;
- considering the need for inclusion of structures to reduce severance effects on bats;
- provision of alternative roosting habitat for bats;
- 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; and
- provision of additional ponds where necessary (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.

7.4.33 Some of the above may also be achieved through strategic mitigation, which is currently being discussed with relevant stakeholders.

Summary of likely residual significant effects

7.4.34 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 16.

Table 16: Residual significant effects on ecological resources/features during construction

Resource/feature	Residual effect	Level at which the effect would be significant
Maghole Brook and Ashfield District Dumble LWS	Permanent adverse effect on site integrity due to loss of LWS habitats and associated species and changes in hydrology.	Up to county/metropolitan (in each case)
Hucknall Disused Railways LWS	Permanent adverse effect on site integrity due to loss of LWS habitats and associated species.	County/metropolitan
New Hucknall Sidings Grasslands LWS	Permanent adverse effect on site integrity due to loss of LWS habitats and associated species.	County/metropolitan
Spring Farm Pasture, Huthwaite LWS	Permanent adverse effect on site integrity due to loss of LWS habitats and associated species.	County/metropolitan
Woodland	Permanent loss of up to 7ha of woodland outside designated sites, loss of 9ha of wood pasture and parkland habitat, and potential adverse effect on ancient woodland. New woodland planting is included in the Proposed Scheme design.	Up to county/metropolitan.
Grassland	Permanent adverse effect from loss of grassland outside designated sites[70].	Up to district/borough
Hedgerows	Permanent loss of 20km[71] of hedgerows and fragmentation of hedgerow network.	Up to district/borough
Watercourses	Permanent adverse effect from loss and fragmentation of minor watercourses.	Up to district/borough
Water bodies	Permanent loss of 13 water bodies. New water bodies are included in scheme design to address losses.	Up to district/borough
Ancient and veteran trees	Permanent adverse effect from potential loss of ancient and veteran trees.	Up to district/borough (in each case)
Bats	Potential permanent adverse effect on conservation status due to loss of roosts, foraging habitat and fragmentation.	Up to regional

[70] This figure will be refined in the formal ES.
[71] This figure will be refined in the formal ES.

Resource/feature	Residual effect	Level at which the effect would be significant
Otter	Potential permanent adverse effect on conservation status due to habitat loss and fragmentation affecting watercourses and also loss of ponds.	Up to county/metropolitan
Water vole	Potential adverse effect on conservation status due to loss and fragmentation of habitat along watercourses.	County/metropolitan
Polecat	Potential permanent adverse effect on conservation status due to loss of habitat.	Up to county/metropolitan.
Great crested newt	Loss of 13 ponds and surrounding terrestrial habitat which may support great crested newts.	Up to county/metropolitan.
Birds	Potential permanent adverse effect on conservation status due to loss, fragmentation and/or severance of habitat for nesting and feeding.	Up to county/metropolitan
White-clawed crayfish	Potential permanent adverse effect on conservation status due to loss of habitat.	Up to County/metropolitan
Aquatic invertebrates (other than white-clawed crayfish)	Potential permanent adverse effect on conservation status due to loss of habitat.	Up to district/borough level
Terrestrial invertebrates	Potential permanent adverse effect on conservation status due to loss of habitat.	Up to district/borough level
Fish	Potential permanent adverse effect on conservation status due to loss of habitat along watercourses.	Up to district/borough level
Reptiles	Potential permanent adverse effect on conservation status due to loss of habitat.	Up to district/borough level

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 which 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 the Normanton Brook and Maghole Brook, 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.

7.5.5 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

7.5.6 Additional mitigation measures currently being considered include:

- structures to reduce mortality to bats; and
- updating the HS2 barn owl mitigation plan[72] 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 Proposed Scheme in consultation with landowners.

Summary of likely residual significant effects

7.5.7 Taking into account mitigation included as part of the Proposed Scheme design, the anticipated significant residual ecological effects during operation are detailed in Table 17.

Table 17: 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 regional
Barn owl	Potential permanent adverse effect on conservation status due to collision with trains.	Up to county/metropolitan

[72] Currently in development for Phase One of HS2

Monitoring

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

7.5.9 There are no area-specific requirements for monitoring ecology and biodiversity effects or mitigation during the operation of the Proposed Scheme in the Pinxton to Newton and Huthwaite area.

8 Health

8.1 Introduction

8.1.1 This section identifies the communities within the Pixton to Newton and Huthwaite area 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 with Public Health England (PHE), Directors of Public Health and Health and Wellbeing Boards. The purpose of the engagement has been to increase the understanding of health issues 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 Pinxton to Newton and Huthwaite 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: LA08 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, Section 8 and the Scope and Methodology Report (SMR) [73].

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.

8.2.4 The health determinants of relevance within the Pinxton to Newton and Huthwaite area are:

- for impacts during construction (temporary and permanent):

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

  - neighbourhood quality;
  - access to services, health and social care;
  - access to green space, recreation and physical activity; and
  - social capital[74].
- for impacts during operation (permanent):
  - neighbourhood quality.

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 Pinxton to Newton and Huthwaite area

8.3.1 For the purposes of the health assessment, the study area is divided into the communities described below, including those settlements which are situated within

[74] The connections between the individuals within communities, and the inclination that arises through these networks for individuals to feel valued, to feel a sense of belonging, to have companionship and to tangibly support each other.

1km of the route of the Proposed Scheme. A description of community facilities is provided in Section 6, Community.

8.3.2 The route of the Proposed Scheme would run through both rural and urban areas, comprising agricultural land interspersed with scattered settlements, towns and villages, farmsteads and woodland.

Pinxton, South Normanton and surrounds

8.3.3 The village of Pinxton comprises approximately 1,950 residential properties, the nearest of which would be located approximately 450m to the west of the route of the Proposed Scheme. The village of South Normanton comprises approximately 4,900 residential properties, the closest of which would lie approximately 35m west of the route of the Proposed Scheme.

8.3.4 Pinxton provides a range of community resources including education facilities (two infant schools and a junior school), health facilities (a GP surgery and pharmacy), a youth centre (Pinxton Community Youth Centre) and places of worship (St. Helens Church and Town Street Methodist Church). Other facilities include parks and outdoor spaces, recreation grounds and a playground.

8.3.5 There are a wide range of community resources in South Normanton, including education facilities (including a nursery, infant school, junior school, and secondary school), community space (Post Mill Centre), places of worship (St. Michael & Angels Church and Junction 28 Church) and a number of public houses and restaurants. Areas of recreational open space include Hamlet Lane Playing Fields.

Hilcote and surrounds

8.3.6 Hilcote is a village situated approximately 45m south of the route of the Proposed Scheme and comprises approximately 320 residential properties. It is bounded to the north, east, and west by agricultural land and lies approximately 1km west of Sutton-in-Ashfield. It is connected to Huthwaite, which is approximately 1km north-east, by the B6026 Huthwaite Lane.

8.3.7 Community facilities in Hilcote comprise a shop which includes a post office, general store and off-licence, public houses (the Hilcote Country Club, the Hilcote Miners Welfare and Community Centre and the Hilcote Arms), a Methodist church and a care home (Normanton Lodge Care Home). Areas of open and recreational space include the Hilcote Royal Oak Meadow and Woodland, which provides an area of green space for recreation and is currently being converted into a nature reserve as part of a community initiative.

Huthwaite and surrounds

8.3.8 Huthwaite is a village comprising approximately 150 residential properties, which lies approximately 250m east of the route of the Proposed Scheme. Huthwaite adjoins the town of Sutton-in-Ashfield to the west with access to the town via Sutton Road and Huthwaite Road.

8.3.9 Community resources within Huthwaite include All Saints Church and Centre, a medical centre, a primary school, and post office. Other facilities include the Brierly

Forest Country Park and Visitor Centre and Brierly Forest Golf Club, which provide opportunities for active and passive recreation.

Blackwell, Newton and surrounds

8.3.10 Blackwell is a village comprising approximately 430 residential properties, the closest of which would lie approximately 500m south-west of the route of the Proposed Scheme. Much of the village (the area known as Old Blackwell) follows a linear route along Alfreton Road which connects with the village of Newton to the north. Newton comprises approximately 690 residential properties and lies immediately north of the route of the Proposed Scheme.

8.3.11 There are a range of community resources in Blackwell including healthcare facilities (Blackwell Medical Centre and a pharmacy), education facilities (Blackwell Children's Centre, Tiny Tots Day Nursery, Blackwell Primary School), care homes (Blackwell Care Home and Amberleigh Manor Care Home), community facilities (a community centre, Blackwell Miners' Welfare Social Club), and a Methodist church. Other facilities include Primrose Hill and Gloves Lane Playing Fields and a children's playground.

8.3.12 Community facilities in Newton include a post office, community centres (Newton Community Centre and Sherwood Street Social Club), public houses, education facilities (Newton Primary School and Newton Nursery) and the Newton Methodist Church Fellowship. Other facilities include recreational open spaces including allotments on Littlemoor Lane.

Demographic and health profile of the Pinxton to Newton and Huthwaite area

8.3.13 The local communities potentially affected by the Proposed Scheme in the Pinxton to Newton and Huthwaite area have a relatively high population density, commensurate with the mixed rural and suburban nature of the area.

8.3.14 Data provided by the Office of National Statistics[75] show that this population has a somewhat worse health status overall compared with the national (England) averages.

8.3.15 The population is more deprived than the national average with regard to the combined indices of multiple deprivation[76], and the health domain (a sub-set of the indices of multiple deprivation). The area as a whole is considered to be less resilient than the national average with regard to changes in relevant health determinants, and with some vulnerabilities in terms of the health status of the population.

8.3.16 The available data provide detail down to ward level and enable a profile to be made of the population within the Pinxton to Newton and Huthwaite area. The description of the whole population, and the populations within wards, does not

[75] The Office of 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.
[76] 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

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. Insofar 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 Public Rights of Way (PRoW) and roads to maintain access (see Section 14, Traffic and transport for further detail).

8.4.2 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)[77], which provides a general basis for route-wide construction environmental management. Contractors would also be required to 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).

[77] Supporting document: Draft Code of Construction Practice

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 will affect neighbourhood quality through impacts such as noise, air emissions, visual impacts and additional traffic, including heavy goods vehicles (HGVs). These will be assessed in the relevant sections of the ES, with a focus on those receptors, or groups of receptors, that are most affected. The Community section of the ES will provide a combined assessment, which will identify locations that are subject to significant environmental effects on two or more topics (e.g. noise 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 Pinxton to Newton and Huthwaite area, taking account of mitigation measures contained in the 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 may have temporary and permanent[78] impacts on neighbourhood quality in areas close to construction sites, including residential areas at Pinxton, South Normanton, Hilcote, Huthwaite, Blackwell and Newton. 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 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 listed in Section 13, Sound, noise and vibration.

8.4.14 It is currently anticipated that the construction of the Proposed Scheme may be visible from a number of locations, as listed in Section 11, Landscape and visual. These impacts have the potential to contribute to impacts on neighbourhood quality. This will be assessed in the formal ES.

8.4.15 Traffic and transport impacts in the Pinxton to Newton and Huthwaite area may 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.

8.4.16 Construction traffic, including HGVs, would be present on a number of roads in the area, as listed in Section 14, Traffic and transport.

8.4.17 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 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.

8.4.18 Settlements in the Pinxton to Newton and Huthwaite area include the largely urbanised villages of Pinxton and South Normanton and the smaller rural villages of Hilcote, Huthwaite, Blackwell, and Newton. Construction activities and permanent structures would be visible from a number of locations due to the scale of the Proposed Scheme. Section 11, Landscape and visual, identifies locations that may experience changes to existing views, including country roads, PRoW and views from properties close to the Proposed Scheme. Effects on views of the rural landscape may

[78] 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.

have negative impacts on residents' perceptions of the quality and character of their local environment, leading to a reduction in wellbeing.

8.4.19 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

8.4.20 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.

8.4.21 The Pinxton to Newton and Huthwaite area is predominantly rural in character. Typically, there is a reliance on shops and services in nearby towns and villages. Opportunities to access alternative services and facilities are limited, resulting in the necessity to travel longer distances to access alternative facilities. 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

8.4.22 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 local amenity, can influence participation in physical activity. Physical activity is strongly linked to health outcomes.

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

- impacts of construction traffic, including HGVs, on pedestrians and cyclists;
- any loss of green space or facility used for physical activity; and
- the presence of construction traffic, including HGVs, on the local road network, which may deter their use by walkers, cyclists and equestrians.

8.4.24 The route of the Proposed Scheme would intersect a number of PRoW in the Pinxton to Newton and Huthwaite area during construction. The effects on amenity and recreational value of these footpath networks, and therefore levels of physical activity and associated health and wellbeing benefits, will be reported in the formal ES.

8.4.25 Construction traffic would mainly use site haul routes along the route of the Proposed Scheme. Some construction traffic, however, including HGVs, would be present on a number of roads in this area, as outlined in Section 14, Traffic and transport. This could obstruct or deter pedestrians, cyclists and equestrians from using these routes. In the case of recreational users, it is considered that alternative routes are likely to be

available in most cases, and therefore that impacts on the affected roads would not reduce overall levels of recreational non-motorised users. For those using affected routes for active travel to work or to access shops and services, there is the possibility that people would choose instead to travel by car, temporarily reducing levels of physical activity and associated health and wellbeing benefits.

8.4.26 Land required for the Hilcote west embankment would result in the temporary loss of approximately 35% of Hilcote Royal Oak Meadow and Woodlands for approximately three years and one month, and the permanent loss of 6% of Hilcote Royal Oak Meadow and Woodlands. This is an area of open space currently being converted into a nature reserve by Hilcote Environmental Leisure Project, a community group run by village residents. Access to the meadow and woodlands makes a positive contribution to the local community through the provision of an area for passive recreation and access to green space. The temporary loss of 35% and permanent loss of 6% of Hilcote Royal Oak Meadow and Woodlands would have an adverse effect on health and well-being.

8.4.27 It is estimated that approximately 20% of a playing field off South Street (situated off Alfreton Road, between Blackwell and Newton) would be temporarily lost[79] for a period of approximately two years and six months, due to the construction of the Newton west cutting. The playing field makes a positive contribution to the local community through the provision of an area for physical activity and recreation. The temporary loss of 20% of the playing field would have an adverse effect on health and well-being.

Social capital

8.4.28 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.[80]'

8.4.29 There is moderate evidence for a link between social capital and health and wellbeing outcomes. A change in social capital has the potential to influence 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.

[79] the temporary lost period will be reported in the formal ES
[80] Office for National Statistics (ONS) (2014) *Measuring Social Capital*. Available online at: http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/dcp171766_371693.pdf

8.4.30 Settlements in the Pinxton to Newton and Huthwaite area support 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 main compounds north and south of the A38 Alfreton Road, and satellite compounds in the vicinity of the villages of Newton and Hilcote. The duration of the works at each site would range from approximately one to four years. 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 local settlements, particularly Newton and Hilcote.

8.4.31 The introduction of a temporary construction workforce into communities has the potential to alter people's perceptions about 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.

8.4.32 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.

8.4.33 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.

8.4.34 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.

8.4.35 In Pinxton works associated with the Brookhill Lane embankment would require the demolition of two residential properties. However, the demolition of these properties would not constitute an erosion of social networks and impact on residents' health and wellbeing, and no health effects are anticipated on the remaining community.

8.4.36 In South Normanton, it is currently anticipated that two residential properties would be demolished as a result of the Cartwright Lane cutting. However, the demolition of these properties would not constitute an erosion of social networks and impact on residents' health and wellbeing, and no health effects are anticipated on the remaining community.

8.4.37 In Hilcote, works associated with the Hilcote west embankment would require the demolition of one residential property. However, the demolition of this property would not constitute an erosion of social networks and impact on residents' health and wellbeing, and no health effects are anticipated on the remaining community.

8.4.38 Within the Huthwaite area, works associated with the Hilcote east embankment would require the demolition of one residential property on Huthwaite Lane and one residential property off Blackwell road. However, the demolition of this property would not constitute an erosion of social networks and impact on residents' health and wellbeing, and no health effects are anticipated on the remaining community.

8.4.39 In Blackwell, works associated with the Newton east cutting would require the demolition of four residential properties. However, the demolition of these properties would not constitute an erosion of social networks and impact on residents' health and wellbeing, and no health effects are anticipated on the remaining community.

8.4.40 In Newton, the development of the Alfreton Road box structure would require the demolition of 18 residential properties. The erosion of social networks resulting from these demolitions would have the potential to reduce the beneficial health effects that are gained through social contact and support for the remaining community.

8.4.41 Effects on residents directly impacted by demolitions are assessed in Volume 3, Section 7, Health.

8.4.42 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 rural communities. Potential health and well-being effects will be reported in the formal ES.

Other mitigation measures

8.4.43 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.

8.4.44 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.

8.4.45 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 Pinxton to Newton and Huthwaite 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 listed in Section 13, Sound, noise and vibration. The permanent features of the Proposed Scheme would be visible from nearby neighbourhoods, as described in Section 11, Landscape and visual. These impacts have the potential to contribute to impacts on neighbourhood quality. This will be assessed in the formal ES.

Other mitigation measures

8.5.3 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

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

8.5.5 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 Pinxton to Newton and Huthwaite area. Consideration is given to the extent and value (significance) 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, Derbyshire County Council (DCC), Nottinghamshire County Council (NCC) 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: LA08 Map Book. Only designated heritage assets within the Pinxton to Newton and Huthwaite area are shown on maps CT-10-374b to CT-10-376a and CT-10-410a. 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 (numbers prefixed MDR and MNT). 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 draft Scope and Methodology Report (SMR) [81], 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

[81] 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 250m in urban areas and 500m in rural areas. This is referred to in the remainder of this assessment as the 250m or 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 significance 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 been undertaken on that basis. However, although the following assets are within the land required for the construction of the Proposed Scheme and may be affected, any effect is unlikely to be significant:

- Great Central Railway, Derbyshire Main Line, (route of) (MDR11055); and
- Blackwell Branch of the Midland Railway (MDR5895).

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 and 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 result of field surveys will be included as part of 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.

9.2.12 At the time of writing, the Nottinghamshire HER data were not fully available, and will be reported in full in the formal ES.

9.3 Environmental baseline

Existing baseline

9.3.1 Baseline data were collated from a variety of sources in compiling this assessment, including:

- the NHLE (Historic England register of designated heritage assets);
- Derbyshire HER;
- conservation area appraisals;
- historic maps and aerial photography; and
- relevant documentary and published sources at Derbyshire and Nottinghamshire County Record Offices.

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

Designated assets

9.3.3 The Old Blackwell Conservation Area of moderate value is 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 the 2km study area:

- one scheduled monument comprising Pinxton Castle motte and fortified manor with moated site and five fishponds (NHLE 1010025), of high value;
- two Grade II* listed buildings comprising Church of St Michael, South Normanton (NHLE 1108933) and Newton Old Hall (NHLE 1367111), the latter located within Newton Conservation Area. Both are of high value;
- fourteen Grade II listed buildings, including four within Old Blackwell Conservation Area, two within Newton Conservation Area, along with two farmhouses, and six other domestic, rural, commercial and industrial buildings. For example, Brookhill Hall (NHLE 1335430) and the Stableblock at Brookhill Hall (NHLE 1108924). All are of moderate value; and
- Newton Conservation Area of moderate value.

Non-designated assets

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

- park at Brookhill Hall, Kirkby in Ashfield (MDR5893, MNT26715); and
- earthworks, Church Hill, Blackwell (MDR5882).

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

- Brookhill Farm House and associated outbuildings (identified on the 1838 Pinxton Tithe);
- earthworks 350m west of Crow Trees Farm, Pinxton (MDR11177);
- possible mining remains, Fulwood (MNT6954);
- South Normanton Colliery (site of), aka 'Winterbank' or 'Wincobank', South Normanton (MDR11184);
- New Hucknall Colliery Branch and Blackwell Colliery Branch (MNT14003 and 14004);
- inclined plane (site of), near Berristow Farm, South Normanton (MDR5894);
- Great Central Railway, Derbyshire Main Line, (route of) (MDR11055);
- Tramroad (route of) from Huthwaite Colliery (Notts) to Pinxton Wharf (MDR5892);
- Blackwell Branch of the Midland Railway (MDR5895);
- map depiction of bridge, Sutton in Ashfield (MNT12266);
- Yew Tree Farm (identified on the OS map 1880);
- Artefact Scatter south-east of Red Barn Farm Newton (MDR 5896);
- Longside Cottage Farm (identified on the OS map 1880);
- colliery (site of), east of Red Barn Farm, Newton (MDR16581);
- Blackwell Collieries B Winning Pit (site of) and colliery village, Hilcote (MDR7845);
- three extant houses north of Huthwaite Lane (identified on 1839 Blackwell Tithe and the OS map 1880; within Old Blackwell Conservation Area); and
- Devonshire Cottage (identified on 1839 Blackwell Tithe).

9.3.7 Non-designated heritage assets located partially or wholly within 500m of the land required, temporarily or permanently, for the construction and operation of the Proposed Scheme include:

- two assets of moderate value, comprising evidence for prehistoric and

Romano-British activity; and

- four assets of low value, predominantly of post-medieval date and comprising areas of mining activity.

Historic environment overview

9.3.8 Known evidence of prehistoric activity within the 500m study area is limited to a scatter of flint artefacts recovered during field walking to the south of Red Barn Farm (MDR5896) adjacent to the Proposed Scheme. A total of 84 pieces of worked flint, including awls, scrapers and blades were recovered with the bulk of the material appearing to be Late Neolithic or Early Bronze Age in date although there were also some artefacts dating from the Late Mesolithic including a fabricator possibly used for retouching other flint tools. The artefacts were found on a break of slope overlooking a valley.

9.3.9 Romano-British activity within the 500m study area is limited to two areas where pottery has been recovered. The southernmost findspot of Romano-British pottery (MDR11172) was to the south of Pinxton Castle, to the west of the Proposed Scheme, where five sherds were identified. Two small concentrations of Romano-British pottery were collected during field walking to the south of Red Barn Farm (MDR5896). These findspots may indicate small scale occupation during the Romano-British period. In the wider landscape, to the west of the Proposed Scheme, the principal Roman road is Ryknield Street between Derby, Chesterfield and the Roman site of Templeborough near Rotherham.

9.3.10 Within the churchyard of the Grade II listed Church of St. Werburgh (NHLE 1108973) is the location of a stone cross dating to the 7th or 8th century (MDR5860) which has been subsequently moved into the church. This is the only recorded archaeological evidence for early medieval activity within the study area. However, both South Normanton and Newton were recorded within the Domesday Survey of 1086, indicating that both of these settlements had been established by the late 11th century.

9.3.11 The most prominent surviving evidence from the medieval period is Pinxton Castle (NHLE 1010025), a scheduled monument, situated approximately 250m west of the Proposed Scheme. The castle comprises a motte dating from the 12th century which subsequently became a fortified manor during the medieval period. The motte is situated within a landscape which includes five former fishponds associated with the castle. The motte may have been constructed by Roger de Wynn who held the manor of Pinxton from 1120 and would have been constructed during the civil war between Stephen and Matilda when landlords built castles to establish their local dominance. Although many of these castles were subsequently abandoned following the accession of Henry II, as many illegally built castles were ordered to be dismantled, Pinxton Castle appears to have been occupied as a fortified manor site for the remainder of the medieval period.

9.3.12 Also of medieval date, are the earthworks recorded at Church Hill, Blackwell (MDR5882), which form an enclosed hilltop plateau. There are traces of a stone wall

with clay mortar exposed on the edge of the scarp and it has been suggested during previous studies that the earthworks represent a medieval manorial site.

9.3.13 The post medieval period is represented at the southern end of the Proposed Scheme where it passes through the post-medieval parkland (MDR5893, MNT26715) associated with the Grade II listed Brookhill Hall (NHLE 1335430), an early 17th century hunting lodge owned by James I and Charles II before the estate was obtained by the Coke family who rebuilt the house.

9.3.14 Newton Old Hall (NHLE 1367111) is located approximately 100m north of the Proposed Scheme. The hall dates from the mid-17th century and within its grounds is the site of a chapel constructed in the late 17th century. Two sets of gate piers and an attached stretch of wall which form the boundary of the hall are Grade II listed (NHLE 1108974).

9.3.15 The geology within the 500m study area comprises the Middle Pennine Coal Measures and consequently there is extensive evidence for post-medieval mining activity. This includes the sites of several collieries dating from the 19th century onwards at South Normanton (MDR11184), Berristow (MDR11183), Newton (MDR16581), and Blackwell (MDR7845). Infrastructure associated with these collieries includes a former inclined plane (MDR5894) and tramroads (MDR5892). The expansion of the coal mining industry had a significant effect on local patterns of population. Local villages including Pinxton, South Normanton, Hucknall, Huthwaite and Hilcote expanded rapidly during the late 19th and 20th centuries due to the need to house workers for the mines and associated industry.

9.3.16 The transport network which supported the increase in mining activity is represented by the routes of two former railway lines which pass through the land required for the Proposed Scheme. The Grand Central Main Line (MDR11055) formerly ran between Sheffield and London Marylebone. It was opened in 1899 and closed during the 1960s. The 500m study area also contains the route of the Blackwell branch of the Midland Railway (MDR5895).

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 as far as reasonably practical.

9.4.2 Section 8 of the draft Code of Construction Practice (CoCP)[82] 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

[82]Supporting document: Draft Code of Construction Practice

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 The following significant effects are expected to occur as a result of temporary impacts on designated or non-designated heritage assets due to changes to their settings.

9.4.5 Brookhill Hall (NHLE 1335430) and the Stableblock at Brookhill Hall (NHLE 1108924) are Grade II listed buildings of moderate value. The hall and stables are located approximately 80m and 20m, respectively, to the west of the land required for the construction of the Proposed Scheme within a non-designated parkland (MDR5893, MNT26715) which includes mature gardens, a lake and woodlands, also of moderate value. The hall comprises an extended 17th century house with the adjacent architecturally elaborate 19th century stable block. The parkland setting has evolved and now includes a modern tree-lined avenue which extends south-eastwards from Brookhill Hall and provides a focussed view to and from the house. The assets derive their significance from their architectural interest and historic and evidential value as a well-preserved example of 17th century and later manorial architecture within a designed landscape which forms an integral element of the setting of the asset. The setting of Brookhill Hall and the Stableblock would be adversely affected by construction activities as the land required for the construction of the Proposed Scheme would affect the eastern half of the park. Construction activities associated with Maghole Brook viaduct, Maghole Brook satellite compound, Brookhill Lane realignment and Brookhill Lane embankment would adversely affect views to and from the asset within its landscape setting by interrupting the designed view provided by the tree-lined avenue and therefore would adversely impact the ability to fully appreciate the heritage significance of the asset. This would constitute a medium magnitude of impact on the listed buildings, resulting in a moderate adverse effect.

9.4.6 Newton Conservation Area is of moderate value and falls partially within the land required for the construction of the Proposed Scheme. The conservation area extends from the historic core of the settlement along the B6026 Cragg Lane. The special architectural and historic interest of the Newton Conservation Area is due to the settlement representing a local example of a turn of the 20th century agricultural settlement where the historical core of the village has remained largely untouched by later development. The rural character is enhanced by a number of impressive

buildings and their relationship with their surroundings. The rural landscape surrounding the conservation area forms its setting and contributes positively towards its significance and the appreciation and experience of its special interest. The rural landscape between Newton and Old Blackwell represents a significant feature in the development of both settlements and is noted by BDC as an important view from Newton. This view would be affected by construction activities associated with Newton east cutting and B6026 Cragg Lane overbridge. This would adversely affect the setting of the conservation area and would be a medium magnitude of impact, resulting in a moderate adverse effect.

Permanent effects

9.4.7 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.

9.4.8 The following significant effects are currently expected to occur as a result of permanent physical impacts on heritage assets within the land required for the construction and operation of the Proposed Scheme.

9.4.9 The non-designated parkland at Brookhill Hall (MDR5893, MNT26715) is of moderate value. It covers 24ha and includes mature gardens, a lake and woodlands. The parkland positively contributes to the setting of the Grade II listed buildings of Brookhill Hall (NHLE 1335430) and Stableblock at Brookhill Hall (NHLE 1108924), and is a discrete historic parkland landscape with surviving coherence. The land required for the construction of the Proposed Scheme would encompass 20% of the parkland to the east. The construction of Maghole Brook viaduct, Brookhill Lane realignment and Brookhill Lane embankment would physically impact upon the parkland. A balancing pond would be constructed within the parkland causing a permanent loss of historic integrity of this section of open parkland to the east of Brookhill Hall. This would have a medium magnitude of impact, resulting in a moderate adverse effect.

9.4.10 Brookhill Hall Farm is a non-designated heritage asset of low value. It is located within the land required for the construction of the Proposed Scheme. It comprises a farm that is recorded on the Pinxton tithe map of 1838 and first edition Ordnance Survey map. Its setting is defined by the surrounding agricultural landscape which contributes positively to its significance. It would be demolished as part of the construction of the Brookhill Lane embankment. This would have a high magnitude of impact, resulting in moderate adverse effect.

9.4.11 The earthworks 350m west of Crow Trees Farm, Pinxton (MDR11177) and possible mining remains, Fulwood (MNT6954) are non-designated heritage assets of low value. They are located within the land required for the construction of the Proposed Scheme. Together they comprise an area of surviving historical earthworks that relate to the industrial extraction of coal on a small-scale localised basis which is characteristic of the rural landscape of the area. The construction of the Farmwell Lane main compound would have a high magnitude of impact on the archaeological remains resulting in a moderate adverse effect.

9.4.12 Yew Tree Farm is a non-designated heritage asset of low value. It is located within the land required for the construction of the Proposed Scheme. It comprises a farm that is recorded on the first edition Ordnance Survey map. Its setting is defined by the surrounding agricultural landscape which contributes positively to its significance. It would be demolished as part of the Proposed Scheme. This would have a high magnitude of impact, resulting in moderate adverse effect.

9.4.13 Longside Cottage Farm is a non-designated heritage asset of low value. It is located within the land required for the construction of the Proposed Scheme. It comprises a farm that is recorded on the first edition Ordnance Survey map. Its setting is defined by the surrounding agricultural landscape which contributes positively to its significance. It would be demolished as part of the Proposed Scheme. This would have a high magnitude of impact, resulting in moderate adverse effect.

9.4.14 Old Blackwell Conservation Area lies partially within the land required for the Proposed Scheme on the Sheffield spur, and is considered to be of moderate value. Approximately 25% of the conservation area would be located within the land required for the construction of the Proposed Scheme. The configuration of the street layout has largely remained unaltered since the early 19th century. The linear settlement retains its rural character despite the construction of the nearby M1. The conservation area contains a small number of listed buildings with other buildings assessed as making a positive contribution to its special interest; three of these other buildings will be removed during construction of the Proposed Scheme. The setting is defined by its surrounding rural landscape and spatial relationship to the Newton Conservation Area, both of which contribute positively to its significance. Construction of the Proposed Scheme would alter not only the setting of the conservation area but also have physical impacts on the configuration of rural character and appearance of the settlement. Three non-designated heritage assets will be removed, removing historic fabric and severing the historic route way through the conservation area, resulting in the severance of the conservation area. The land required for the construction of the Proposed Scheme and the construction of Newton east cutting would have a high magnitude of impact, resulting in a major adverse effect.

9.4.15 Devonshire Cottage (OS map 1880) is a non-designated heritage asset of low value. It is located to the west of Cragg Lane within land required for the construction of the Proposed Scheme. It comprises a small thatched cottage constructed by coarse stone elevation to the front, render gable and rear brick elevation that is recorded on the first edition Ordnance Survey map. Its setting is defined by the surrounding fields which contribute positively to its significance. It would be demolished as part of the Proposed Scheme. This would have a high magnitude of impact, resulting in moderate adverse effect.

9.4.16 Within the Old Blackwell Conservation Area there are four buildings (Robin Hood House, Bowcher House, the Cottage and Craig Cottage) that are located to the north of B6026 Huthwaite Lane and within the land required for the construction of the Proposed Scheme. The buildings are identified on 1839 Blackwell Tithe and the OS map 1880 and are of low heritage value. The buildings derive their value from their limited architectural and historic values and their positive contribution to the

character and appearance of the conservation area. The buildings will be demolished as part of the Proposed Scheme. This would have a high magnitude of impact, resulting in moderate adverse effect.

9.4.17 The non-designated medieval earthworks at Church Hill, Blackwell (MDR5882) are of moderate value and partially located within the land required for the Proposed Scheme. The archaeological remains associated with these assets would be physically impacted by the construction of the Proposed Scheme. This would constitute a medium magnitude of impact, and result in a moderate adverse significance of effect.

9.4.18 The following non-designated heritage assets date from the later post medieval and modern periods and illustrate the industrial development of the study area. They are all of low heritage value. The archaeological remains associated with these assets would be physically impacted by the construction of the Proposed Scheme. This would constitute a high magnitude of impact, and result in a moderate adverse significance of effect:

- South Normanton Colliery (site of), aka 'Winterbank' or 'Wincobank', South Normanton (MDR11184);
- New Hucknall Colliery Branch and Blackwell Colliery Branch (MNT14003 and 14004);
- Inclined plane (site of), near Berristow Farm, South Normanton (MDR5894);
- Tramroad (route of) from Huthwaite Colliery (Notts) to Pinxton Wharf (MDR5892);
- Colliery (site of), east of Red Barn Farm, Newton (MDR16581); and
- Blackwell Collieries B Winning Pit (site of) and colliery village, Hilcote (MDR7845).

9.4.19 The following significant effects are currently expected to occur as a result of permanent impact on the setting of designated or non-designated heritage assets.

9.4.20 Brookhill Hall (NHLE 1335430) and the Stableblock at Brookhill Hall (NHLE 1108924) are Grade II listed buildings of moderate value located approximately 80m and 20m respectively to the east of the land required for the construction of the Proposed Scheme. The buildings retain their parkland setting (non-designated Brookhill Park) which represents an important feature in their significance. The presence of Maghole Brook viaduct, Brookhill Lane realignment, highway balancing pond and Brookhill Lane embankment would adversely affect views to and from the assets across the open parkland to the east of the listed buildings as well as the loss of this section of the parkland. This would impact the ability to fully understand and appreciate the heritage significance of the assets. This would constitute a medium magnitude of impact, resulting in a moderate adverse effect.

9.4.21 Old Farm Cottage (NHLE 1335419) is a Grade II listed building of moderate value located in Old Blackwell Conservation Area and is located adjacent to land required for the construction of the Proposed Scheme. It comprises a mid-17th century house that is set back from the main street frontage of the village and enclosed by a series of

small closes. The asset derives its significance from its architectural and historical values as a well-preserved example of early local vernacular architecture in a setting which contributes positively to the appreciation of its significance. The land to the north, which contributes to the setting of the listed building, would be required in order to allow the construction of Newton east cutting which would have a high magnitude of impact, resulting in a major adverse effect.

9.4.22 Three Lane End Farmhouse (NHLE 1054747), is a Grade II listed building of moderate value located in Old Blackwell Conservation Area and is located adjacent to land required for the construction of the Proposed Scheme. It comprises an early 18th century farmhouse with later 19th century refronting. It is located within a farmyard with associated agricultural buildings and fields beyond. The asset derives its significance from its architectural and historical values as a well-preserved example of an early farmhouse and good survival of contemporary associated outbuildings set around an internal yard. The fields to the north, which contribute to the setting of the listed building, are located within the land required for the construction of the Proposed Scheme. This loss of the associated rural landscape would have a medium magnitude of impact, resulting in a moderate adverse effect.

Other mitigation measures

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

9.4.24 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.

9.4.25 As no specific mitigation measures have yet been identified in relation to heritage assets described above, the residual effects are the same as those reported under permanent effects. Over time, the effect on the setting of some heritage assets could change as planting matures and the Proposed Scheme assimilates into the landscape.

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 Map Series CT-06 within the Volume 2: LA08 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.

9.5.6 It is currently anticipated that in relation to the following heritage assets that there would be no significant effects as a result of the operation of the Proposed Scheme and that therefore the significance of effect would remain as described for the permanent construction phase effect:

- Brookhill Hall (NHLE 1335430);
- Stableblock at Brookhill Hall (NHLE 1108924);
- Non-designated parkland at Brookhill (MDR5893, MNT26715);
- Old Blackwell Conservation Area;
- Old Farm Cottage (NHLE 1335419); and
- Three Lane End Farmhouse (NHLE 1054747).

Other mitigation measures

9.5.7 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

9.5.8 As no mitigation beyond that described has been identified, it is currently anticipated that the residual effects would be the same as those reported in the assessment of effects during operation.

Monitoring

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

9.5.10 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 Pinxton to Newton and Huthwaite 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 mineral extraction 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), Ashfield District Council (ADC), Bolsover District Council (BDC), Derbyshire County Council (DCC), Nottinghamshire County Council (NCC), the Environment Agency, the Coal Authority, the Animal and Plant Health Agency (APHA), and the Derbyshire and Peak District RIGS Group, the Geological Society Regional Group East Midlands, the Nottinghamshire Biological and Geological Records Centre, Nottinghamshire RIGS Group, and the Open University Geological Society East Midlands. 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: LA08 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 Scope and Methodology Report (SMR)[83].

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 construction of the Proposed Scheme plus a 250m buffer. In the case of groundwater abstractions, this buffer is increased up to 1km.

[83] 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 mineral resources[84] identified on published minerals 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 relevant minerals plans).

10.2.8 The geo-conservation assessment is based upon local authority and publicly available local geological trust records.

10.3 Environmental baseline

Existing baseline

10.3.1 Baseline data have been collected from a range of sources including Ordnance Survey mapping, the BGS, Coal Authority, ADC, BDC, DCC, NCC, Public Health England (PHE), the Environment Agency, Natural England, APHA as well as from local geological trusts.

[84] Defined in the SMR as 'mineral body including aggregates, salt, coal and other hydrocarbons, Petroleum Extraction Development Licences (PEDL), Shale Prospective Areas (ShPA)'.

Geology

10.3.2 This section describes the underlying ground conditions within the Pinxton to Newton and Huthwaite area. Recent changes in lithostratigraphic classifications by the BGS have been incorporated where appropriate[85].

10.3.3 Table 18 provides a summary of the geology (made ground, superficial and bedrock units) underlying the study area.

Table 18: Summary of the geology underlying the land quality study area

Geology	Distribution	Formation description	Aquifer classification
Made ground			
Made ground	Adjacent to Normanton Brook and Nunn Brook, beneath the East Midlands Designer Outlet, and to the west and south-west of Huthwaite.	Artificial ground comprising variable deposits of reworked natural and man-made materials.	Not classified
Superficial			
Alluvium	Associated with the River Erewash and its tributaries to the south of Pinxton, along Normanton Brook, and along Nunn Brook.	Clay, silt, sand, peat and gravel.	Secondary A
Bedrock			
Zechstein Group - Cadeby Formation	Localised outcrops to the west of Sutton-in-Ashfield and to the north and east of Newtonwood Lodge Farm.	Dolostone (dolomitic limestone) with mudstone, dolomitic siltstone and sandstone.	Principal
Pennine Coal Measures Group - Pennine Middle Coal Measures Formation	Underlying the majority of the study area.	Mudstone, siltstone, sandstone, with coal seams.	Secondary A

Made ground

10.3.4 Made ground is a term used to denote man-made deposits such as landfill, 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 this area, for example where ponds, sand or marl pits have been backfilled. There is evidence of historical and authorised landfilling within the study area, which may comprise more significant deposits of made ground. Furthermore, colliery spoil tips are present.

10.3.5 The BGS geological mapping[86,87], including artificial ground mapping data, indicates the presence of made ground within the study area in the vicinity of Normanton Brook

[85] British Geological Survey, (2001), *Stratigraphical framework for Westphalian to Early Permian re-bed successions of the Pennine Basin Research Report RR/13/01.* Available online at: http://www.bgs.ac.uk/downloads/start.cfm?id=300
[86] British Geological Survey (1963), geological map sheet 112 (Chesterfield) 1:50:000 scale (Solid and Drift)

and Nunn Brook, and beneath the East Midlands Designer Outlet. Other areas of made ground deposits are recorded to the west and south-west of Huthwaite.

10.3.6 No known farm burial or pyre sites associated with the 1967 and 2001 outbreaks of foot and mouth disease (FMD) are known to be present within the Pinxton to Newton and Huthwaite study area. The 2001 to 2002 FMD outbreak risk assessment map[88] identifies the Pinxton to Newton and Huthwaite study area to lie within a FMD free county. However, older unrecorded sites may be present from the 1967 outbreak. In all cases, records do not provide an exact location for the burial or pyre sites. Similarly, anthrax-infected cattle burials may be present, generally relating to burials over 50 to 100 years ago. However, no records have been found of any such burials.

Superficial geology

10.3.7 Alluvial deposits variably comprising silty clay, silt, sand, peat and gravel occur along the courses of streams and rivers. Alluvium is present in the study area associated with the River Erewash and its tributaries to the south of Pinxton, along Normanton Brook and Nunn Brook, and along a tributary to the east of Nunn Brook which flows from north to south 160m to the east of land required for the construction of the Proposed Scheme, south-west of Huthwaite. The route of the Proposed Scheme would intersect an area of alluvial deposits related to Nunn Brook to the west of Huthwaite.

Bedrock geology

10.3.8 The bedrock geology in the majority of this area comprises the Pennine Coal Measures Group with discrete outcrops of the younger Zechstein Group.

10.3.9 Outcrops of the Cadeby Formation are present to the west of Sutton-in-Ashfield, along the A38 Alfreton Road, and at the eastern end of the study area. Further outcrops are also present in the area to the north and east of Newtonwood Lodge Farm in the north of the study area. This formation generally comprises dolostone with subordinate layers of mudstone, dolomitic siltstone and sandstone. Within the study area, the Cadeby Formation includes a main dolostone unit (dolomitic limestone) between a mudstone and calcareous[89] unit.

10.3.10 The Pennine Middle Coal Measures Formation forms the shallow bedrock across the majority of the study area. This formation is generally described as mudstone, siltstone, and sandstone with coal seams. Across the study area, this formation is folded and outcrops of sandstone alternate with outcrops of mudstone and siltstone.

Radon

10.3.11 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[90].

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[87] BGS (2016) Geology – 1:50,000 (DIGMapGB-50) Artificial Version 8
[88] Animal Plant and Health Agency (2001), Foot and Mouth Disease 2001 County Series Map 01.10.2001
[89] Calcareous means comprising calcite or calcium carbonate
[90] British Geological Survey (2017) *Radon data: radon potential dataset*. 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 online at: www.ukradon.org/information/ukmaps.

10.3.12 Three sections of the route lie within the following radon affected areas:

- the land required for the construction of the Proposed Scheme between Nunn Brook and Pinxton;
- the majority of the land required for the construction of the Sheffield spur; and
- the land required for the construction of the Proposed Scheme line to the west of Huthwaite.

10.3.13 It is estimated that 5 to 10% of homes are estimated to be at or above the action level of 200 becquerels per cubic metre of air (Bq/m3) for residential properties within the majority of the land required for the construction of the Sheffield spur. For land required for the construction of the Proposed Scheme to the west of Huthwaite, it is estimated that between 3% and 5% have radon levels at or above the action level. For the land required for the construction of the Proposed Scheme between Nunn Brook and Pinxton it is estimated that between 1 and 3% of homes are at or above the stated action level. For the remainder of the study area, less than 1% of homes are at or above the radon action level.

10.3.14 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/m3.

Groundwater

10.3.15 Two aquifer designations have been identified within the study area, as defined by the Environment Agency[91]:

- the Zechstein Group comprising the Cadeby Formation is designated as a Principal aquifer; and
- the Alluvium and the Pennine Middle Coal Measures Formation are designated as Secondary A aquifers.

10.3.16 The Environment Agency reports that no licensed private groundwater abstractions are located within the study area. It is recognised that other unlicensed abstractions may exist.

10.3.17 There are no groundwater Source Protections Zones (SPZ)[92] identified within the study area. Additionally, the study area is not identified to lie within a groundwater Drinking Water Safeguard Zone.

10.3.18 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 SPZ1 and a default 250m radius SPZ2. There is no default SPZ3 for total catchment with respect to this type of abstraction.

[91] Environment Agency (2017), *New groundwater vulnerability mapping methodology mapping in England and Wales, Report SC040016/R.*
[92] 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.

10.3.19 Further information on the groundwater in Pinxton to Newton and Huthwaite area is provided in Section 15, Water resources and flood risk.

Surface water

10.3.20 Normanton Brook, designated as a main river by the Environment Agency, and Nunn Brook, designated as an ordinary watercourse by the Environment Agency, are the main watercourses within the study area. Nunn Brook flows from east to west into Normanton Brook, which then flows west between Blackwell and South Normanton. Normanton Brook would be crossed by the route of the Proposed Scheme and the Nunn Brook would be affected by land required for the construction of the Proposed Scheme, both between South Fulwood Industrial Estate and Hilcote.

10.3.21 The land required for the construction of the Proposed Scheme in the north of the study area would also intersect a number of tributaries and drains of Nunn Brook which generally flow from north to south. The Sheffield spur would intersect a number of tributaries of Morton Brook (ordinary watercourse), where the main channel passes just beyond the north-western boundary of the study area.

10.3.22 Maghole Brook, an ordinary watercourse, flows from north-east to south-west, defining the southern boundary of the study area and would be crossed by the route of the Proposed Scheme. The route of the Proposed Scheme would intersect a further tributary of Maghole Brook together with two unnamed ponds 480m to the south of the A38 Alfreton Road.

10.3.23 Other surface water features within the study area include a tributary of Normanton Brook flowing from north to south 580m west of the M1, and a number of unnamed ponds at the northern extent of the study area, and along Normanton Brook and Nunn Brook.

10.3.24 Surface water bodies in the Pinxton to Newton and Huthwaite area are described in more detail in Section 15, Water resources and flood risk.

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

10.3.26 The Environment Agency's Drinking Water Protection Areas – Surface water Safeguard Zone mapping indicates that the majority of the study area lies within a surface water safeguarding area that is under pressure from pesticides.

10.3.27 There are no records of any registered private surface water supplies within the study area. Further information on surface water in the Pinxton to Newton and Huthwaite 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 one active landfill site and 18 industrial sites. The key potentially contaminative sites are:

- Alloga UK distribution depot;
- two petrol filling stations;
- Export Drive active landfill; and
- an industrial estate with electric sub-stations and tanks.

10.3.29 Historical land uses identified within the study area with the potential to have caused contamination include five landfill sites, 36 mining sites and 21 industrial sites. Infilled pits and ponds may have been filled with a variety of waste materials, but have not been licensed. The key historical potentially contaminative sites are:

- Crow Trees Farm Landfill;
- Blackwell Tip;
- Diminsdale Colliery;
- historic railway land;
- South Normanton Colliery; and
- probable shallow coal mining in the majority of the study area.

10.3.30 Further details of these current and historical contaminative land uses within the study area are shown in Table 19,Table 20 and Table 21.

Table 19: Current and historical landfill sites located in the study area

Name and Area Reference	Location	Description
Fulwood/disused railway cutting (LA08-07)	Located offsite immediately east of the land required for the construction of the Proposed Scheme, 130m to the south of the Crow Trees Farm landfill.	The Environment Agency records indicate that the historical landfill was licensed in 1979 to accept inert, industrial, commercial and household waste. The first deposit of waste occurred in 1979 and the last input was in 1982, when the licence was surrendered. The area of this landfill is 10.5ha.
Crow Trees Farm landfill (LA08-11)	Located 50m to the east of the land required for the construction of the Proposed Scheme to the south of Bowring Transport landfill.	The Environment Agency does not hold any information about licenses. The first deposit of waste occurred in 1984 and the last input was in 1989. This historical landfill was used for disposal of inert waste. No information is available on closure dates. The area of this landfill is 6,490m^2.
Bowring Transport (LA08-11)	Located adjacent east of the land required for the construction of the Proposed Scheme, immediately south of the A38 Alfreton Road.	The Environment Agency does not hold any information concerning licenses or waste types input to this historical landfill, or closure dates. The area of this landfill is 23.9ha.
Export Drive (LA08-14)	Located immediately to the east of the land required for the construction of the Proposed Scheme within Fulwood Industrial Estate.	Environment Agency records show that this landfill is active; however, current mapping shows this landfill has been re-developed as part of the Fulwood Industrial Estate. This landfill previously accepted non-biodegradable waste. The records also indicate that this landfill first accepted waste in June 1981 with last input unknown. The area of this landfill is 18.9ha.
Blackwell Tip (LA08-15)	The route of the Proposed Scheme would intersect this historical landfill 500m to the north of the A38 Alfreton Road and west of Fulwood Industrial Estate.	The Environment Agency records show that the historical landfill was licensed in March 1978 to accept inert waste. The first deposit of waste occurred in 1959 and the last input was in November 1986.The licence was surrendered in December 1986. The area of this landfill is 12.20ha.
B6026 Cragg Lane (LA08-40)	The Sheffield spur would intersect this historical landfill 50m to the west of the M1 north of Newton.	This historical landfill was for the disposal of industrial, commercial and household waste. The Environment Agency records show that the last waste input was in 1978, no further information is available on licence surrender or closure dates. The area of this landfill is

		10.08ha.

Table 20: Current and historical mining, mineral sites and colliery spoil sites located within the study area

Name and Area Reference	Location	Description
Langton Hall Colliery (LA08-01)	Situated within the land required for the construction of the Proposed Scheme, to the east of Pinxton and adjacent east of the M1.	Langton Hall colliery was in operation between 1844 and 1967. A number of underground roadways were built to connect to other collieries in the area. At present a light industrial premise can be found near Langton Hall.
South Normanton Colliery (LA08-10)	Within the land required for the construction of the Proposed Scheme, located at the site of current East Midlands Designer Outlet in South Normanton.	Colliery with associated railway infrastructure and several tanks present until circa 1963.
Diminsdale Colliery (LA08-29)	Within the land required for the construction of the Proposed Scheme between Huthwaite and Tibshelf, 150m to the east of the M1.	Diminsdale Colliery to 1884; mineral railway, Infilled land and spoil heaps to present.
Spoil Heaps (LA08-36 and LA08-37)	Located within the land required for the construction of the Proposed Scheme north of Hilcote.	Spoil heaps north of Hilcote being deposited in the 1960s and 1980s, currently undeveloped land.
Mount Pleasant Opencast workings (LA08-44, LA08-48, LA08-72 to LA08-74)	Located along the Sheffield spur in a number of locations within the land required for the construction of the Proposed Scheme and extending south.	A number of areas briefly worked around Mount Pleasant, often present for such short periods they do not appear on historical mapping.
Mine entries and shallow mining areas (LA08-87 to LA08-101, LA08-107, LA08-109, LA08-110, LA08-112, LA08-113, LA08-117, LA08-129, LA08-131, LA08-132)	Located across most of the study area, in particular across the land required for the construction of the Sheffield spur and across the land required for the construction of the Proposed Scheme between Nunn Brook and the Silverhill Trail.	Several CA coal mine entries all classified as shafts and areas of probable shallow coal mining.

Table 21: Current and historical industrial sites located within the study area

Name and Area Reference	Location	Description
Brookhill Industrial Estate (LA08-03)	Located 150m west of the land required for the construction of the Proposed Scheme south of Pinxton centred around Brookhill Lane.	Numerous heavy industrial and commercial sites including plastic fabrication, vehicle scrappage yards, architectural glazing, ceramic-steel composite production, road haulage and freight, asphalt and tarmac contractors, lace textile and fabrics manufacturer.

Name and Area Reference	Location	Description
Alfreton Road Shell Petrol Filling Station (LA08-84)	Adjacent north of both land required for the construction of the Proposed Scheme and the A38 Alfreton Road, located south of Huthwaite.	Petrol filling station operated by Shell.
Fulwood Industrial Estate (LA08-16)	Site is within the land required for the construction of the Proposed Scheme, located south of Huthwaite along Common Road.	The Fulwood Industrial Estate has been present since the 1980s, currently hosting a number of commercial and industrial properties including depots and builders merchants.
South Normanton Industrial Estate (LA08-49)	Adjacent west of the land required for the construction of the Proposed Scheme, located north-east of South Normanton.	The South Normanton Industrial Estate currently containing heavy industrial units such as a plastic component manufacturer and van rental company.
The County Estate (LA08-18)	Situated adjacent east of the land required for the construction of the Proposed Scheme, south-west of Huthwaite along Nunn Brook Road.	The County Estate has been present since the 1980s, currently housing a number of businesses including a HGV refuelling station and electronics manufacturer.
Former railway land (LA08-30, LA08-47, LA08-115, LA08-118 to LA08-124)	Numerous areas of historic and current railway land located throughout the study area and the land required for the construction of the Proposed Scheme.	A number of small spurs to serve collieries and other historic lines connecting mining towns are present in the study area, with the majority now disused.
Tibshelf Motorway Service Area (LA08-32)	The site lies within the land required for the construction of the Proposed Scheme, between Tibshelf and Huthwaite, serving the southbound (adjacent east) of the M1.	Tibshelf Motorway Service Area east operated by Shell with refuelling area, welfare facilities and areas for HGV parking.

10.3.31 Contaminants commonly associated with sites in Table 19, Table 20 and Table 21 could include metals, semi-metals, asbestos, organic and inorganic compounds. Additionally, infilled pits and landfills could also give rise to landfill gases such as methane or carbon dioxide and leachate.

10.3.32 Contaminants commonly associated with mining and mineral sites could include heavy metals, acid mine waters and mine gases such as methane, carbon dioxide and hydrogen sulphide.

Other regulatory data

10.3.33 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).

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

10.3.35 There were 23 minor pollution incidents (Category 3) and one significant pollution incident (Category 2) to controlled waters reported in the Pinxton to Newton and

Huthwaite area between 1995 and 2007. Both incidents were located outside of the land required for the construction of the Proposed Scheme.

10.3.36 There are 11 authorised environmental permits (formerly Local Authority Pollution Prevention and Control permits) registered within the study area. The permits are registered to a fuel station, a metal foundry process, two mobile screening and crushing processes, a bulk cement process, an ink manufacturer, a vehicle respraying process and a surface cleaning process. All permits are located outside the land required for the construction of the Proposed Scheme.

10.3.37 The Environment Agency reports that there is one active and one revoked consented discharge to groundwater via soakaway within the study area, neither of which are within the land required for the construction of the Proposed Scheme. Further details on the groundwater in Pinxton to Newton and Huthwaite area can be found in Section 15, Water resources and flood risk.

10.3.38 There are 12 active and 20 revoked discharge consents to surface water within the study area. One of the active consents is shown within the land required for the construction of the Proposed Scheme.

10.3.39 There are no nationally significant ecological designations as defined in the land quality section of the SMR[93] located within the study area. Further information on ecological designated sites in the Pinxton to Newton and Huthwaite area are described in more detail in Section 7, Ecology and Biodiversity.

Mining/mineral resources

10.3.40 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 include 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).

Minerals plans

10.3.41 NCC is responsible for the overall mineral and waste local plans for the county. The Minerals Local Plan (MLP) for Nottinghamshire[94] was adopted in December 2005 and sets out policies aimed at controlling mineral related developments up to 2014. The plan is currently in the process of being replaced by a new MLP for 2016 to 2036. An issues and options consultation document[95] has been published as part of the new plan development process.

[93] Sensitive ecological receptors are defined as national designations such as SSSI.
[94] Nottinghamshire County Council (2005) *Nottinghamshire Minerals Local Plan.* Available online at: http://www.nottinghamshire.gov.uk/media/110638/mineral-local-plan.pdf
[95] Nottinghamshire Minerals Local Plan Issues & Options Consultation. Available online at: http://www.nottinghamshire.gov.uk/media/127419/issues-options-2017.pdf

10.3.42 Policies and proposals for mineral workings in Derbyshire are set out in the DCC MLP for Derby and Derbyshire[96] which was adopted in April 2000 and amended in February 2002. The existing MLP is going to be replaced by the new Minerals Local Plan, which is being prepared jointly with Derby City Council (DeCC). The new Minerals Local Plan will guide the mineral-related development (outside the Peak District National Park) until 2030. A rolling consultation process is ongoing and a series of papers were published for comment over a period of time.

10.3.43 Both current NCC and DCC MLPs do not list any mineral extraction allocation sites within the study area.

10.3.44 The locations of other mining resources within the study area are described below.

Coal

Shallow/ Open cast coal mining

10.3.45 NCC issues and options consultation document includes a plan showing the proposed extent of minerals safeguarding. The plan shows that there is a proposed Mineral Safeguarding Area (MSA) within the study area concerning surface coal. The MSA covers the whole of the study area.

10.3.46 The DCC and DeCC document for mineral safeguarding shows how the whole study area lies over a surface coal resource. Although not all the mineral resources will be classified a MSA, the document states that all known surface coal that has not already been worked should be safeguarded assuming that the study area will be designated as a MSA for surface coal.

10.3.47 The MSA listed above are proposed and not within the adopted minerals plan. They have not therefore, been considered further in the assessment.

10.3.48 Available records from the Coal Authority show that the land required for the construction of the Proposed Scheme would not fall within any areas of current or historically licensed coal mining, but does pass through localised areas of unlicensed historical open cast coal mining. The areas are located to the north of Normanton Brook west of Hilcote and west of Newton.

10.3.49 In addition, the Coal Authority identify areas of probable shallow coal mining workings across the majority of the land required for the construction of the Sheffield spur. The workings also underlie the majority of the land required for the construction of the Proposed Scheme between the A38 Alfreton Road to 1.5km to the north, adjacent to Longside Cottage Farm. Abandoned underground roadways connecting two areas of workings are within the study area; on the northern side of Normanton Brook and partially intersecting the route of the Proposed Scheme from south to north.

[96] Derby City Council and Derbyshire County Council (2000) *Derby and Derbyshire Minerals Local Plan. Final draft 2000.* Available online at: https://www.derbyshire.gov.uk/site-elements/documents/pdf/environment/planning/planning-policy/minerals-waste-development-framework/derby-and-derbyshire-minerals-local-plan-part-one.pdf

Deep coal mining

10.3.50 Available records from the Coal Authority show that the land required for the construction of the Proposed Scheme would not be within any areas of current or historically licensed coal mining, however coal seams are located at depth at Blackwell and along the land required for the construction of the Sheffield spur.

10.3.51 The mine working area described above also has a large number of mine entries that indicate the recorded (chartered) entrance to an underground mine working. The route of the Proposed Scheme passes over a number of mine entries, all defined as shafts west of Sutton-in-Ashfield, which are denoted as a colliery.

10.3.52 Three former collieries of note comprise South Normanton which lies 70m to the west of the route of the Proposed Scheme in the location of East Midlands Designer Outlet; Blackwell Colliery which lies 360m to the west of the land required for the construction of the Sheffield spur; and south of Hilcote which lies within the land required for the construction of the Proposed Scheme between Huthwaite and Tibshelf.

Petroleum Exploration and Development Licences (PEDL)

10.3.53 There are two current licences for hydrocarbon exploration within the study area. The land required for the construction of the Proposed Scheme lies within the PEDL 299 and PEDL 303 areas, the land required for the construction of the Sheffield spur is only within the PEDL 303 area. Both licences are within the initial term (petroleum exploration works, 5-year programme), which started in 2016.

Geo-conservation resources

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

Receptors

10.3.55 The sensitive receptors that have been identified within the study area are summarised in Table 22. A definition of receptor sensitivity is given in the SMR.

Table 22: Summary of sensitive receptors

Issue	Receptor type	Receptor description	Receptor sensitivity
Land contamination	People	Residents at existing properties, schools, study centres, play areas and public open space	High
		Employees and visitors at nearby commercial areas, including retail parks and hotels	Moderate
		Industrial	Low
	Groundwater	Principal aquifer – Cadeby Formation	High
		Secondary Aquifers – alluvium and Pennine Middle Coal Measures Formation.	Moderate
	Surface waters	Nunn Brook, Normanton Brook and its tributaries, tributaries of Morton Brook, and Maghole Brook and its tributaries.	Moderate
	Built environment	Underground structures and buried services	Low

Issue	Receptor type	Receptor description	Receptor sensitivity
Impacts on mining/mineral and petroleum (gas) sites (severance and sterilisation)	Mining/mineral sites	Proposed surface coal MSAs	Low
		Petroleum Exploration and Development Licences 299 and 303	Moderate

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)[97]. 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 5, 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 (Sections 5, 6 and 14);
- methods to monitor and manage flood risk and other extreme weather events which may affect land quality during construction (Sections 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

[97] 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 and British Standards BS10175 and BS8576 ,and the Construction Industry Research and Information Association (CIRIA) SP32[98] CIRIA (1983) SP32, Construction over abandoned mine workings.

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[99]. 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 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: LA08 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, commercial and mining 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

[98] Construction Industry Research and Information Association (CIRIA) (1983) SP32 Construction over abandoned mine workings.
[99] Sustainable Remediation Forum UK, (2010), *A Framework for Assessing the Sustainability of Soil and Groundwater Remediation.*

associated off line works;

- 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 23. 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 23: Summary of baseline CSM for sites which may pose a contaminative risk for the Proposed Scheme

Area reference[100]	Area name	Human health risk	Ground water risk	Surface water risk	Ecosystem risk	Buildings risk
On site[101]						
LA08-05, LA08-31 and LA08-69	Brookhill Hall Farm, Newtonwood Lodge Farm and historic unnamed farm (Farms group)	Low to moderate/low	Moderate/low	Low	Low	Low
LA08-01, LA08-02, LA08-07, LA08-12, LA08-17, LA08-25, LA08-29, LA08-30, LA08-32, LA08-45 to LA08-47, LA08-55, LA08-84, LA08-114, LA08-115, LA08-119 to LA08-124, and LA08-130.	Key sites include the Tibshelf Motorway Service area (east), historic railway lands, industrial estates and fuel station (Industrial/ commercial group)	Low to moderate	Moderate/low	Moderate/low	Moderate/low	Moderate/low
LA08-09, LA08-53	A depot with tanks and a timber yard (Light industrial/commerc	Very low to moderate/low	Moderate/low	Low	Low	Moderate/low

[100] Each potentially contaminated site is allocated a unique reference number.
[101] 'On site' is within the area of land required for construction of the Proposed Scheme.

Area reference[100]	Area name	Human health risk	Ground water risk	Surface water risk	Ecosystem risk	Buildings risk
	ial group)					
LA08-36, LA08-37, LA08-48, LA08-72 and LA08-73	Key sites include a former quarry, spoil heaps and opencast workings (Quarries and backfilled opencast group)	Very low to moderate/low	Moderate/low	Moderate/low	Very low	Moderate/low
LA08-08, LA08-15, LA08-40	Key sites include historic landfills, and a backfilled railway cutting (Landfill and infilled land group)	Very low to moderate/low	Moderate/low	Moderate/low	Moderate/low	Moderate/low
LA08-19, LA08-21, LA08-22, LA08-39, LA08-63 LA08-88, LA08-89, LA08-90, LA08-91, LA08-92, LA08-94 to LA08-96, LA08-98, LA08-101, LA08-107, LA08-109, LA08-110, LA08-112, LA08-117, LA08-129, LA08-131, and LA08-132.	Key sites include probable shallow coal mining areas and shafts (Shallow mining areas)	Low to moderate	Low	Low	Moderate/low	Low
LA08-125	Marshland	Moderate/low	N/A	N/A	N/A	Moderate/low
Off site[102]						
LA08-03, LA08-16, LA08-18, LA08-34, LA08-35, LA08-42, LA08-49, LA08-57, LA08-75, LA08-83, LA08-118	Key sites include railway land, electric sub-stations, a gas governor, a service station, tanks, sewage works and an industrial estate (Off site industrial and commercial group)	Low to moderate	Moderate/low	Moderate/low	Moderate/low	Moderate/low
LA08-77	Current garage land use	Very low to moderate	Moderate/low	N/A[103]	Very low	Moderate/low

[102] 'Off site' is beyond the land required for construction of the Proposed Scheme but within 250m of it.
[103] N/A refers to the receptor being absent or a receptor being not applicable to the contaminant sources being assessed.

Area reference[100]	Area name	Human health risk	Ground water risk	Surface water risk	Ecosystem risk	Building s risk
LA08-44 and LA8-74	Opencast workings	Very low to moderate/low	Moderate/low	Low	Low	Moderate/low
LA08-11, LA08-14 LA08-116	Crow Trees Farm historic landfill and Rear of Auto Alloys historic landfill (Off site landfill and infilled land group)	Very low to moderate/low	Moderate/low	Moderate/low	Low	Moderate/low
LA08-41, LA08-43, LA08-52, LA08-87, LA08-93, LA08-97, LA08-99, LA08-100 and LA08-113	Key sites include shafts and probable shallow coal mining (Off site shallow mining areas)	Low to moderate	Moderate/low	Moderate/low	Moderate/low	Moderate/low

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.

10.4.14 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.

10.4.15 All of the sites set out in Table 23 have been assessed for the change in impact associated with the construction stage for the work. Table 24 presents a summary of the resulting construction effects that have been found to be significant. All other sites referenced in Table 23 were found to have non-significant effects.

Table 24: Summary of construction CSM effects

Name and area ref	Receptor	Main baseline risk range	Main construction risk range	Temporary effect
LA08-19, LA08-21, LA08-22, LA08-39, LA08-88, LA08-89, LA08-90, LA08-91, LA08-92, LA08-94, LA08-95, LA08-96, LA08-98, LA08-101, LA08-107, LA08-109, LA08-110, LA08-112, LA08-117, LA08-129, LA08-131, LA08-132 (Shallow mining areas) Key sites include probable shallow coal mining areas and shafts	Human health – (direct contact, ingestion, inhalation of vapours from contaminated soils, waters and inhalation of ground gases on site)	Low	Moderate	Moderate adverse (significant)
	Controlled waters - groundwater	Low	Moderate	Moderate adverse (significant)
	Impact on property – ground gas and aggressive ground	Low	Moderate	Moderate adverse (significant)

10.4.16 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.

10.4.17 For other sites unrelated to mining, the adoption of the draft CoCP makes it unlikely that there would be significant adverse effects, but it is considered that there may still be some temporary minor adverse effects during the construction period from ground disturbance in these areas. These minor adverse impacts at the construction stage are not regarded as significant in line with the methodology set out in the SMR.

10.4.18 The assessment has considered the extent of earthworks required together with the specific nature of the potential current and historical contamination sources and receptors identified. The following key issues have been identified which the draft CoCP will address:

- historic Blackwell Tip landfill would be crossed by the Proposed Scheme. Landfill records indicate that the backfill material of the Blackwell Tip site may comprise inert material; and
- the Cragg Lane historic landfill underlies the Newton East Cutting. The aforementioned cutting and viaducts will require excavation into what is expected to be backfilled material. Landfill records Table 19 indicate that the Cragg Lane fill may include commercial, industrial and household material. There is the potential for large quantities of excavated material to be generated from construction which may require treatment prior to re-use.

10.4.19 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

10.4.20 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.

10.4.21 The magnitude of the permanent effects and their significance has 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 neutral even if the risk is assessed to remain as high. 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 construction boundary. As noted above, a worsening would result in adverse effects and an improvement would result in beneficial effects.

10.4.22 All of the sites set out in Table 23 have been assessed for a change in impact associated with the permanent post-construction stage. Table 25 presents the summary of the resulting (post construction) effects that have been found to be significant. All other sites referenced in Table 23 were found to have non-significant (neutral or minor beneficial) effects.

Table 25: Summary of permanent (post-construction) effects

Name and area ref	Receptor	Main baseline risk range	Main post-construction risk range	Post-construction effect
LA08-01, LA08-02, LA08-07, LA08-12, LA08-17, LA08-25, LA08-29, LA08-30, LA08-32, LA08-45 to LA08-47, LA08-55, LA08-84, LA08-114, LA08-115, LA08-119 to LA08-124, and LA08-130. (Industrial/ commercial group) Key sites: Tibshelf Motorway Service area (east), historic railway lands, industrial estates and fuel station	Human health – (direct contact, ingestion, inhalation of vapours from contaminated soils, waters and inhalation of ground gases on site)	Moderate/low to moderate	Very low to low	Moderate beneficial (significant)

Name and area ref	Receptor	Main baseline risk range	Main post-construction risk range	Post-construction effect
LA08-36, LA08-37, LA08-48, LA08-72 and LA08-73. (Quarries and backfilled opencast group) Former quarry, spoil heaps and opencast workings	Human health – (direct contact, ingestion, inhalation of vapours from contaminated soils, waters and inhalation of ground gases on site)	Moderate/ low	Very low	Moderate beneficial (significant)
LA08-08, LA08-15, LA08-40 (Landfill and infilled land group) Historic landfills, historic pond and a backfilled railway cutting	Controlled waters – groundwater	Moderate/ low	Very low	Moderate beneficial (significant)
	Controlled waters – surface waters	Moderate/ low	Very low	Moderate beneficial (significant)
	Impact on ecological/ geological receptors	Moderate/low	Very low	Moderate beneficial (significant)

10.4.23 Table 25 indicates that where remediation is carried out on sites identified within the land required for the construction of the Proposed Scheme, there will in most instances be overall moderate beneficial effects which are considered to be significant.

10.4.24 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.

10.4.25 Significant beneficial effects are anticipated in relation to the Cragg Lane and the Blackwell Tip historic landfill sites, former opencast coal areas and a number of undefined mines and railway sites. These effects are largely due to the removal of exposure pathways through part or full removal of source as a result of construction activities, as the sites lie within the area required for construction of the Proposed Scheme.

10.4.26 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 and property from gas and vapours in the ground, the principal risk in this area, would be controlled to an acceptable level.

Mining/mineral resources

10.4.27 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[104] or isolation that may occur during the construction phase of the Proposed Scheme, possibly continuing through to its operation.

10.4.28 There are no MSA defined in the adopted minerals plans and all MSA discussed previously are proposed within the minerals plan under consultation and therefore not considered as part of this assessment. There are no areas of future licensed opencast coal extraction. Whilst not afforded safeguarded status deeper coal resources are present. There are two PEDL, 299 and 303 located within the land required for the construction of the Proposed Scheme.

Temporary effects

10.4.29 Temporary adverse effects may occur where construction compounds are proposed within an MSA or designated mineral site. In such cases, there would be temporary sterilisation of the resources during construction works, but this is not considered to represent a significant effect and the resource would not be lost permanently.

Petroleum Exploration and Development Licences

10.4.30 All compounds would fall within the PEDL 299 and 303 area. Due to the nature of the resource, extraction does not have to occur directly above it, therefore the effect of construction of the Proposed Scheme on the PEDL is expected to be negligible.

Permanent effects

10.4.31 The majority of effects on mining and mineral sites would be permanent where underlain by the footprint of the permanent works, with a strip of mineral becoming sterilised.

Petroleum Exploration and Development Licences

10.4.32 Due to the nature of the resource, extraction does not have to occur directly above it, therefore the effect of construction of the Proposed Scheme on the PEDL would be negligible

10.4.33 NCC MLP[105] recognises that there is some potential for coal bed methane from coal seams 200m to 1500m deep. There are no current coal bed methane extraction sites within Nottinghamshire. The DCC Minerals Local Plan[106] does not discuss the coal bed methane potential of land underlain by coal. Construction of the Proposed Scheme would be unlikely to place a constraint on future exploitation of potential sources of

[104] 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.
[105] Nottinghamshire County Council (2005) *Nottinghamshire Minerals Local Plan.* Available online at: http://www.nottinghamshire.gov.uk/media/110638/mineral-local-plan.pdf
[106] Derby City Council and Derbyshire County Council (2000) *Derby and Derbyshire Minerals Local Plan. Final draft 2000.* Available online at: https://www.derbyshire.gov.uk/site-elements/documents/pdf/environment/planning/planning-policy/minerals-waste-development-framework/derby-and-derbyshire-minerals-local-plan-part-one.pdf

coal as the extraction technologies have potential to be located either side of the land required for construction of the Proposed Scheme.

10.4.34 Table 26 reports the assessment of permanent effects from construction on the mining and mineral resources identified.

Table 26: Summary of effects for mining and mineral resources

Site name	Status	Description	Sensitivity/ value	Magnitude of impact	Effect and significance (Y/N)
PEDL 299 and PEDL 303	PEDL	Petroleum Exploration and Development Licences	Low	Minor	Negligible (N)

Geo-conservation sites

10.4.35 No geo-conservation areas such as SSSI or LGS are present in the study area.

Other mitigation measures

10.4.36 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.

10.4.37 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 NCC and DCC, and any other relevant parties to assist in achieving an effective management of minerals within the affected location.

Summary of likely residual significant effects

10.4.38 For mining sites, the potential for significant adverse effects has been identified associated with mine gas and mine water in historical workings. For all other sites, and based on the information currently available, and with the application of the mitigation measures detailed above, no likely significant adverse residual effects are anticipated with respect to land quality. However, where remediation is undertaken there may be significant beneficial residual effects.

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 the Castlewood mid-point auto-transformer station located on the west side of the route of the Proposed Scheme, 150m north of the existing Brookhill Lane. Auto-transformer 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 (landfill 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 Pinxton to Newton and Huthwaite 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), Nottinghamshire County Council (NCC), Ashfield District Council (ADC), Bolsover District Council (BDC) 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: LA08 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)[107].

11.2.2 Summer surveys for the landscape and visual assessment were undertaken from July to September 2017, and winter surveys from January to 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 change on

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

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 ZTV 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 ZTV, 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 Proposed Scheme have been assessed as part of the study area.

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 visual effects during construction covers the situation in winter at peak activity. 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 Pinxton to Newton and Huthwaite area extends from Maghole Brook and its confluence with the River Erewash in the south, to the northern side of Alfreton Road in Newton in the north-west, and to Newtonwood Lane, in the north.

11.3.2 The study area is a mix of urban development and rural landscapes. The eastern part of the study area is characterised by a limestone ridge. A plateau of higher ground lies above an escarpment slope, from which many springs emanate. To the west of the limestone ridge, the geology is of the coal measures, and the landform is typically undulating, with many minor ridgelines and valleys.

11.3.3 The underlying geology has had a great influence on the land use of the area. Coal has been mined in the area since the 16th century, and continued until the late 1960s when the last coal mine was closed. In particular, the landscape in the vicinity of Pinxton, Hilcote, Newton and Blackwell was heavily dominated by mining industries and associated mineral railways. Many of the former colliery sites have now been developed as industrial estates or commercial business parks, and the legacy of the railways is a number of recreational routes for walkers, cyclists and horse riders.

11.3.4 There are several settlements within the study area. Kirkby-in-Ashfield, Sutton-in-Ashfield and Huthwaite are located in elevated locations on the plateau in the east of the study area. Other scattered settlements include Hilcote, Old Blackwell, Newton and Blackwell. The core parts of the originally agricultural villages of Old Blackwell and Newton are designated as conservation areas. The corridor of the Proposed Scheme is predominantly agricultural in use. In general, within the study area, arable land occupies the higher land, with smaller fields of pasture located along lower-lying ground, such as the Erewash valley, and close to settlements, including South Normanton. There are two solar farms in the area: one on the southern side of Pinxton Lane (Crow Trees Farm), and the other to the east of Hilcote (Twinyards Farm).

11.3.5 The study area is greatly influenced by the M1, which forms a locally prominent feature, particularly where it runs on an embankment past Pinxton. The landscape around junction 28 of the M1 and along the A38 Alfreton Road is dominated by industrial estates, large-scale warehouses and distribution centres, which form highly visible features on elevated ground.

11.3.6 Generally, there are few areas of woodland within the study area, but there are belts of woodland alongside the M1, along watercourses and disused railway lines, at restored colliery sites, and around the Tibshelf Motorway Service Area in the north of the area. Mature hedgerows and boundary trees contribute to a more enclosed character of landscape closer to settlements.

11.3.7 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[108],

[108] 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

the East Midlands Regional Landscape Character Assessment[109], the Greater Nottingham Landscape Character Assessment[110], and the Landscape Character of Derbyshire[111].

11.3.8 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.

11.3.9 For the purposes of this assessment, the Pinxton to Newton and Huthwaite study area has been subdivided into nine 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.

11.3.10 Five of the nine LCAs would not be significantly affected by the Proposed Scheme on account of their distance from the Proposed Scheme or small proportion affected. Newtonwood Farmlands LCA would be significantly affected by the Proposed Scheme and is included in Volume 2: Community area report LA10: Tibshelf to Shuttlewood as it is located for the most part within the Tibshelf to Shuttlewood area. A summary of the remaining three LCAs that would be significantly affected within the Pinxton to Newton and Huthwaite area is provided in Table 27.

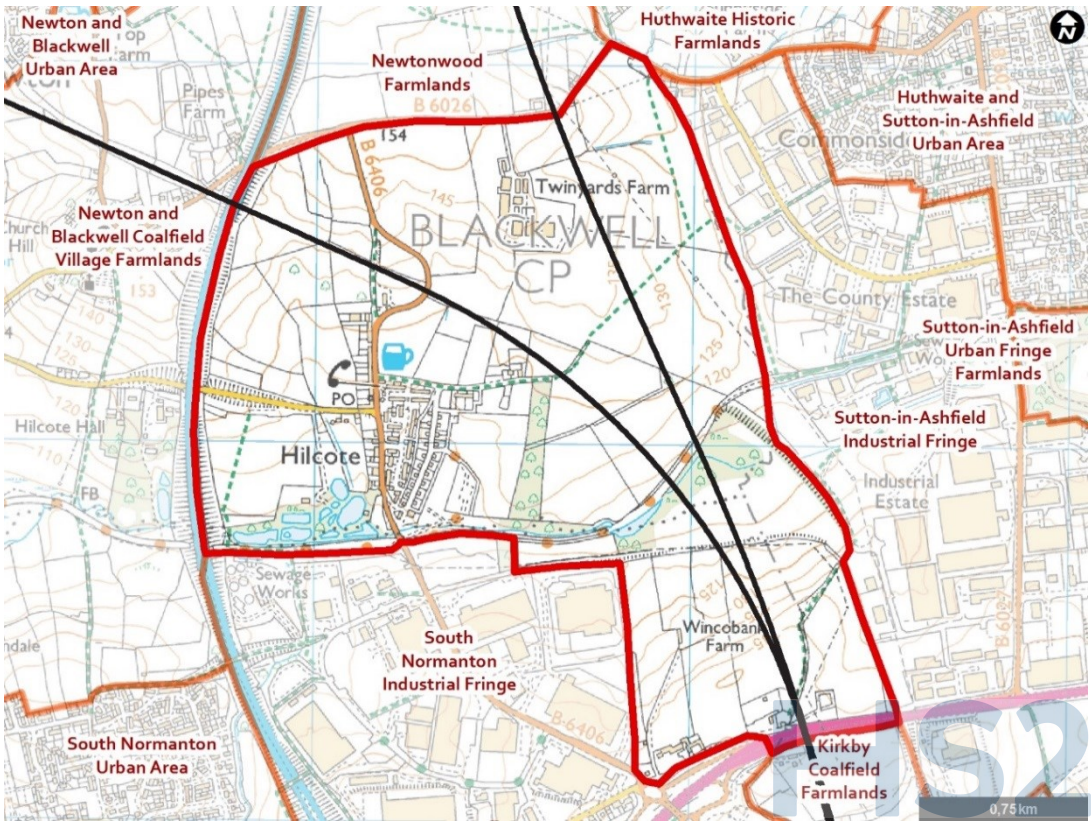
[109] Natural England's East Midlands Region (2010) *East Midlands Regional Landscape Character Assessment*. Available online at: http://publications.naturalengland.org.uk/publication/5635681403535360?category=2431119

[110] Nottinghamshire County Council (2009) *Greater Nottingham Landscape Character Assessment*. Available online at: http://www.rushcliffe.gov.uk/planningpolicy/localplan/supportingstudies

[111] Derbyshire County Council (2014), The Landscape Character of Derbyshire (4th Edition). Available online at: http://www.derbyshire.gov.uk/environment/conservation/landscapecharacter/default.asp

Table 27: Summary of significantly affected LCAs

South Normanton and Hilcote Urban Fringe Farmlands



Open landscape north of Hilcote

Landscape on edge of Hilcote

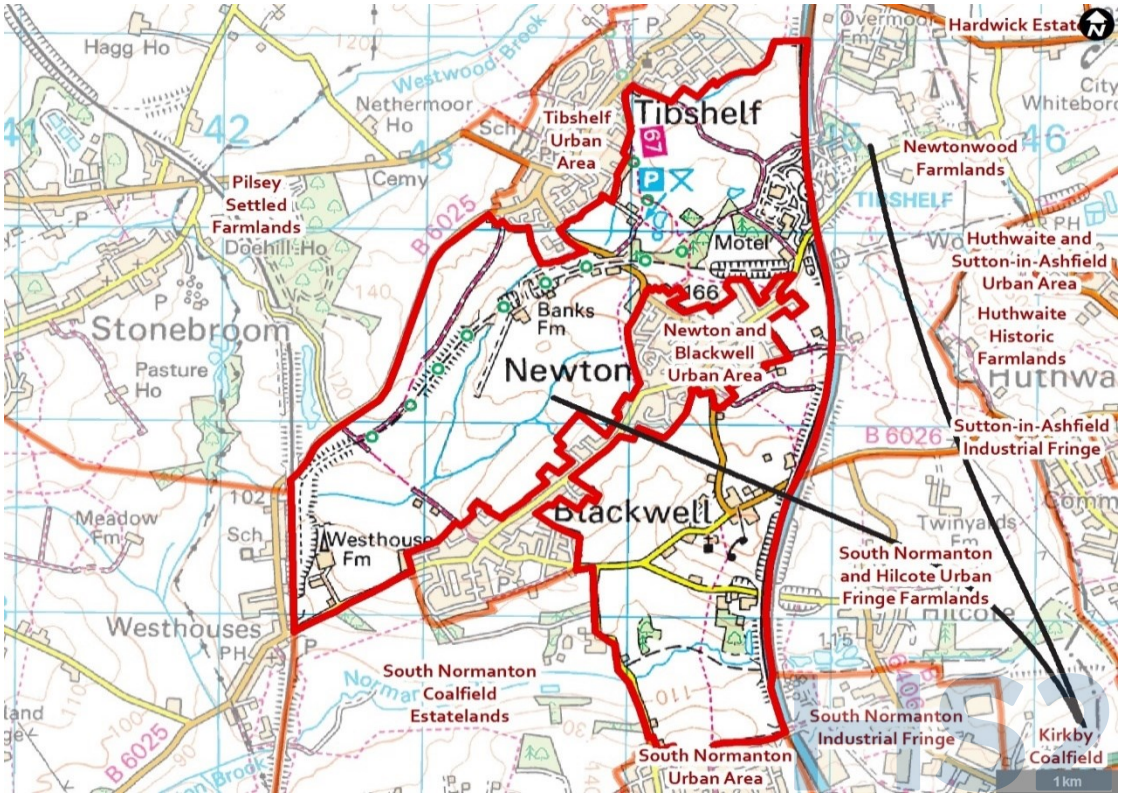
The South Normanton and Hilcote Urban Fringe Farmlands LCA is a rural area strongly influenced by adjacent urban development. The underlying geology comprises coal measures, which have given rise to an undulating landform, drained by the Normanton Brook and a tributary flowing from the north, which both form shallow valleys. The main land use is agricultural land, comprising a mix of arable and pasture fields with low trimmed hedgerow boundaries and few hedgerow trees, giving rise to a relatively open landscape. Settlement is limited to the village of Hilcote, together with a few isolated farmsteads. There is deciduous woodland to the east of Hilcote along Normanton Brook and adjacent to Normanton water treatment works. There is a former landfill site in the south of the LCA, alongside the Normanton Brook, with natural woodland/ scrub regeneration.

The LCA has some heritage interest based on several former coal mines that were located on the eastern side of Hilcote. Several PRoW cross the LCA including the Blackwell Trail, which contribute to the landscape value.

There are many urban influences including the M1, the industrial estates on the eastern and southern boundaries, a solar farm and overhead power lines. Motorway traffic noise notably detracts from an otherwise tranquil area.

The overall value of this LCA is low-medium derived from its mainly rural character, relative tranquillity, heritage interest, and also the presence of the detracting influences of the M1 and the adjacent urban fringe areas.

Newton and Blackwell Coalfield Village Farmlands



Landscape south of Newton

Ridgeline between Newton and Blackwell

The Newton and Blackwell Coalfield Village Farmlands LCA is a gently undulating rural area north and south of Newton and Blackwell. It is underlain by geology of the coal measures, and many former coal mines are located within the LCA. Two parallel ridgelines extend through the LCA in a south-west to north-east direction: one through Newton and the other through Tibshelf. A further ridgeline runs from Newton to Old Blackwell, where Church Hill forms a local high point.

The predominant land use is agricultural, with a mix of arable and pasture. The area immediately to the north of South Normanton has a particularly distinct pattern of small and narrow fields, likely of historic origin. Hedgerow boundaries vary from low and trimmed to more bushy and dense. There are also several small woodland copses.

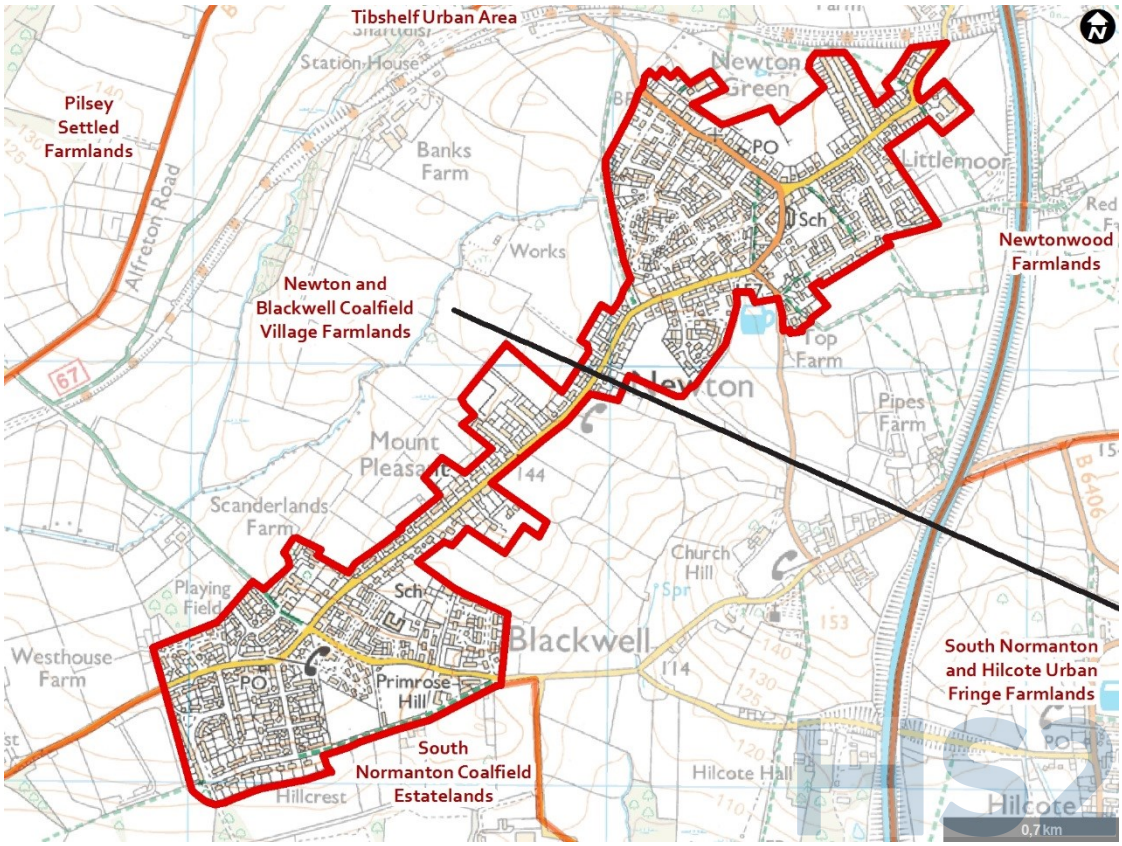
Settlement is limited to the village of Old Blackwell, which contains a conservation area, including four Grade II listed buildings: the Church of St. Werburgh, a tombstone and two farmhouses. Hilcote Hall, south of Hilcote Lane, which is a Grade II listed building, is located outside the conservation area. The undulating landscape in which the village is set is considered to contribute to the character of the village and its conservation area.

Many PRoW radiate out from Newton to the surrounding area. The LCA is crossed from east to west by the Blackwell Trail to the south of Blackwell, and the Silverhill Trail to the north of Newton. The Silverhill Trail runs from Newton to Tibshelf, forming part of the National Cycle Network (NCN) Route 67. The LCA has a strong rural character although influenced by the M1 and adjoining urban areas. Motorway traffic noise notably detracts from an otherwise tranquil area.

The overall value of this LCA is medium derived from its strong rural character, relative tranquillity, historic Old

Blackwell, and also the presence of the detracting influences of the M1.

Newton and Blackwell Urban Area



B6026 Cragg Lane, Newton

Recreation area off Charnwood Crescent, Newton

The Newton and Blackwell Urban Area LCA comprises the villages of Newton and Blackwell linked by residential development along Alfreton Road to form a continuous settlement. The LCA lies along a sandstone ridgeline which dips from Newton (160m AOD) towards Blackwell (120m AOD). Land falls either side of the ridgeline towards the Normanton Brook to the south, and to a valley containing the Silverhill Trail to the north.

Newton Conservation Area extends from the historic core of the settlement along B6026 Cragg Lane. The earliest origins of the settlement date from the early 11th century when the village developed as an agricultural settlement for the surrounding farmsteads until the late 19th century. It is then further expanded to accommodate the growth in local mining activity. Older buildings within the conservation area are typically constructed from local coal measures sandstone while red brick is the main building material for 19th century and later buildings. Within the conservation area, Newton Old Hall is Grade II* listed and there are a further two Grade II listed buildings.

Many PRoW radiate out from Newton to the surrounding area. The Silverhill Trail, part of the NCN route 67, runs through Newton and then north through Tibshelf.

The overall value of this LCA is medium derived from the historic core of Newton, open space and recreational value.

Visual baseline

11.3.11 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: LA08 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[112], 4: Transport, 5: Hotels/healthcare/education and 6: Employment.

11.3.12 Occupants of residential properties with potential views of the Proposed Scheme are located on the outskirts of Kirkby-in-Ashfield and Sutton-in-Ashfield, in smaller settlements, such as Pinxton and South Normanton, in villages and hamlets, such as Blackwell, Old Blackwell and Hilcote, and at scattered farms and other dwellings.

11.3.13 Views from the edges of settlements within the study area are intermittently framed by buildings or trees or filtered by field boundary vegetation, garden or street trees. Settlements in the coalfield and urban fringe farmlands tend to provide residential receptors with characteristically rural views, interspersed with power and communication infrastructure such as pylons, masts and wind turbines.

11.3.14 Residents and users of recreational routes on high ground, such as at Strawberry Bank, Huthwaite, experience long distance, panoramic views over undulating landform, agricultural land, woods and hedgerows, roads, rooftops, industrial development, warehouses, turbines and other infrastructure, filtered by foreground and intervening vegetation.

11.3.15 The Old Blackwell Conservation Area Appraisal[113] has identified important views into, within, and from the conservation area at Old Blackwell. This is where the Church of St. Werburgh Grade II listed building forms a landmark.

11.3.16 Urban residential views are generally dominated by elements of the road network, such as roads, footways, grass verges, and street furniture such as lighting columns and road signs. Views also include dwellings of various types and ages, gardens and trees as well as commercial and industrial development and infrastructure. Urban fringe views often include fields and paddocks with associated sheds, farm buildings and machinery.

11.3.17 Views for users of PRoW are sometimes restricted by hedgerows, trees, and locally rising ground. Views from PRoW on higher ground, such as Kirkby Bridleway 12, leading off Kirkby Lane, are long distance over restored former mineral workings, to open countryside and urban fringe development.

[112] Reference to specific civil parish numbers for footpaths is provided where available otherwise the adjacent road name is used as a reference to the footpath.
[113] Bolsover District Council (2010), Old Blackwell Conservation Area Appraisal and Management Plan. Available online at: https://www.bolsover.gov.uk/images/LIVE/O/old_blackwell_consa_caamp.pdf

11.3.18 Towards the north of the study area near Newton, Blackwell Footpath B3/10/3 crosses the M1. The overbridge provides a vantage point which allows views to the wider surroundings, framed by highway planting beside the M1 and on the bridge embankments.

11.3.19 Views from public footpaths are frequently influenced by the visually intrusive presence of the M1, its traffic, gantries, signage and associated junctions and infrastructure, as well as other detracting features, such as overhead power lines, and large commercial warehouses. The Silverhill Trail (including part of NCN route 67) crosses the study area on a disused railway route. Views from the Silverhill Trail are generally restricted by the railway cutting slopes and belt of woodland, but there are occasional vantage points.

11.3.20 Mature roadside hedgerows, trees and woodland generally limit views for users of local roads. Field gateways, and locations where the roadside hedgerows are lower, offer glimpses and wider views of farmland, hedgerows, trees, buildings and infrastructure.

11.3.21 Transient views experienced by motorists travelling on the M1 are characterised by safety barriers, and other motorway infrastructure, as well as wider views out over the surrounding countryside and industrial areas. Mature highway planting and noise fence barriers on embankments limit views in some areas, such as at Pinxton.

11.3.22 Views experienced by workers in industrial areas are typically limited by adjacent buildings or surrounding mature tree belts.

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 start of 2025 and the end 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)[114] 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[115];
- 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;
- designing lighting to avoid unnecessary intrusion onto adjacent buildings and other land uses; and
- replacement of any trees intended to be retained which may die as a consequence of nearby construction works.

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, erection of viaducts, construction of embankments, the removal of existing landscape elements including trees and hedgerows, and the closure and diversion of existing public highways and PRoW. Other key changes include: the construction of overbridges and underbridges, a mid-point auto-transformer station, overhead power lines, utility diversions, the presence of transfer nodes and pre-cast yards and demolitions of buildings and structures.

Landscape assessment

11.4.7 Based on the current design it is anticipated that the LCAs set out in Table 28 would be significantly affected during construction of the Proposed Scheme.

Table 28: Summary description and judgement of effects on LCAs

South Normanton and Hilcote Urban Fringe Farmlands	**Medium susceptibility and sensitivity**
Susceptibility to change: The relatively open character of the landscape and its rural qualities, albeit with urban influences, impart a medium susceptibility to change arising from the Proposed Scheme. Construction would result in changes to the undulating landform due to the excavation of the Cartwright	Level of effect: Major adverse

[114] Supporting document: Draft Code of Construction Practice
[115] British Standard (2012) *BS5837:2012 Trees in relation to design, demolition and construction – Recommendations*

Lane cutting (up to 18m in depth), both the Normanton Brook west and east embankments (up to 13m in height) and the Hilcote west and east embankments (up to 19m in height) either side of the viaducts across the Normanton Brook. Temporary earthworks stockpiles would form uncharacteristic features in the landscape. Works associated with construction of viaducts across the Normanton Brook (Normanton Brook west viaduct, the Normanton Brook central viaduct and the Normanton Brook east viaduct) would be prominent and uncharacteristic. The construction area would result in the removal of agricultural land, hedgerows and areas of woodland and scrub around Normanton Brook. The loss of vegetation would result in a wide corridor of more open landscape and introduce areas of disturbed land. The scale and prominence of the works, including movement of construction traffic and activities associated with Sheffield spur main compound, the M1 south satellite compound, and the B6026 Huthwaite Lane satellite compound would affect the rural/ urban fringe character of the landscape. Tranquillity would be reduced by construction vehicle movements and noise. Construction works would adversely affect a substantial part of the LCA. There would therefore be a high magnitude of change during construction and major adverse effect.	(significant)
Newton and Blackwell Coalfield Village Farmlands	**Medium susceptibility and sensitivity**
Susceptibility to change: The undulating landform, presence of historic buildings within the Old Blackwell Conservation Area, and rural character albeit with urban influences, impart a medium susceptibility to change arising from the Proposed Scheme. Land required for construction of the Sheffield spur would occupy a corridor of between approximately 200m to 500m in width, and would require the removal of agricultural land, trees and hedgerow boundaries. The loss of vegetation would result in a wide corridor of more open landscape. The scale of construction activity and changes to landform and landcover would affect the character of the predominantly rural landscape. The landscape character would be changed by earthworks required to create the proposed Newton east and Newton west cuttings (up to 12m in depth), and the Old Blackwell retaining wall and Alfreton Road retaining wall. These features would alter the local characteristics of the undulating landform, and create physical and visual severance of the landscape. The historic core of the village within the Old Blackwell Conservation Area would be adversely affected by construction works for the Sheffield spur, through demolition of three buildings, severance of the conservation area, and impacts on the setting of the wider village. Tranquillity would be further reduced by construction vehicle movements and noise, including activities associated with the Alfreton Road satellite compound. Construction of the Proposed Scheme would therefore result in a high magnitude of change and major adverse effect.	Level of effect: Major adverse (significant)
Newton and Blackwell Urban Area	**Medium susceptibility and sensitivity**
Susceptibility to change: The presence of historic buildings within Newton Conservation Area and the continuous nature of the ridgeline settlement of Newton and Blackwell impart a medium susceptibility to change arising from the Proposed Scheme. The LCA would be directly affected by the construction of the Sheffield spur through impacts on the landform, landscape features and vegetation. Construction would result in changes to the local landform as a result of the Newton west and Newton east cuttings (up to 12m in depth) through the ridgeline of Alfreton Road. There would be direct impacts on the character of the linear settlement as a result of demolition of 18 properties on Alfreton Road houses and the loss of their gardens.	Level of effect: Major adverse (significant)

The scale and prominence of the works would change the local character of the settlement. The setting of the historic core of Newton and its conservation area would be adversely affected. The landscape within the LCA would suffer from severance and loss of physical and visual connectivity. Tranquillity would be further reduced by construction vehicle movement and noise, including activities associated with Alfreton Road satellite compound. New uncharacteristic features would substantially alter the character of the LCA. There would therefore be a high magnitude of change during construction and a major adverse effect.	

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 29 describes the potentially significant visual effects based on the current design of the Proposed Scheme. Locations are shown in Map Series LV-03 in the Volume 2: LA08 Map Book.

Table 29: Construction phase potentially significant visual effects

View from Sutton-In-Ashfield Bridleway 60 at junction with Brookhill Lane **(VP 388-03-002) (Map Number LV-03-388)**	**Medium-high sensitivity visual receptors**
Land required for construction of the Proposed Scheme would extend across the whole field of view, and up to the viewpoint. Maghole Brook satellite compound would be situated in the middle distance. Construction works associated with the realignment of Brookhill Lane would dominate close distance views. Construction of the Proposed Scheme, including Maghole Brook viaduct (up to 18m in height), would remove vegetation and introduce new features and components that would be continuously highly visible across the majority of the view in the near to middle distance. There would therefore be a high magnitude of change and major adverse visual effect.	**Level of effect:** Major adverse (significant)
View east from Pinxton Footpath B8/1/1 beside Farmwell Lane **(VP 388-03-003) (Map Number LV-03-388)**	**Medium-high sensitivity visual receptors**
The land required for the construction of the Proposed Scheme would extend across the whole field of view, and in the foreground up to the viewpoint. The Farmwell Lane main compound would be situated opposite the viewpoint on rising ground between Farmwell Lane and Brookhill	**Level of effect:** Major adverse (significant)

Lane. Construction works associated with Farmwell Lane diversion would dominate near distance views. Construction of the Proposed Scheme, including Farmwell Lane underbridge, would remove vegetation on the skyline, and introduce new features and components that would be continuously highly visible across the majority of the view in the near to middle distance. There would therefore be a high magnitude of change and major adverse visual effect.	
View north-east from Blackwell Trail **(VP 389-03-001) (Map Number LV-03-389)**	**High sensitivity visual receptors**
Users of the Blackwell Trail would have middle distance views of prominent construction works of the Normanton Brook west embankment (up to 12m in height) and the three Normanton Brook viaducts (up to 16m in height). Retained trees and scrub in the foreground would provide limited screening. Views to the construction area located on the northern side of the Normanton Brook would be filtered by retained foreground hedgerow trees. Construction traffic using the route from B6406 Berristow Lane along the track beside the warehouse buildings would also be visible in the near distance. There would therefore be a high magnitude of visual change and major adverse effect.	**Level of effect:** Major adverse (significant)
View east from residences, B6406 New Lane, Hilcote **(VP 389-02-005) (Map Number LV-03-389)**	**High sensitivity visual receptors**
From this edge of construction area location, there would be close distance views of the construction area including Hilcote cutting and Hilcote west embankment (up to 13m in height), associated earthworks, construction equipment, movement of construction vehicles, and material stockpiles. Residents in this section of the B6406 New Lane at Hilcote would experience substantial changes to near distance views as a result of the Sheffield spur as the landscape would be altered in its characteristics. There would therefore be a high magnitude of visual change and major adverse effect.	**Level of effect:** Major adverse (significant)
View north-east from residences, B6026 Huthwaite Lane **(VP 389-02-007) (Map Number LV-03-389)**	**High sensitivity** **visual receptors**
From this edge of construction area location, there would be close distance views of the construction area including Newton east cutting, associated earthworks, construction equipment, movement of construction vehicles and material stockpiles. Properties within the Old Blackwell Conservation Area would be demolished, opening up the view. Residents of properties on B6026 Huthwaite Lane would experience substantial changes to near distance views as a result of construction of the Sheffield spur. There would therefore be a high magnitude of visual change and major adverse visual effect.	**Level of effect:** Major adverse (significant)
View from residences, B6026 Huthwaite Lane at start of Blackwell Footpath B3/22/3 **(VP 389-02-009) (Map Number LV-03-389)**	**High sensitivity visual receptors**
From this edge of construction area location, there would be loss of vegetation enabling close distance views of construction activity including the temporary access for Alfreton Road compound, Blackwell M1 box structure, Hilcote cutting, Newton east cutting and B6026 Cragg Lane realignment, associated earthworks, construction equipment, movement of construction vehicles and material stockpiles. Users of Blackwell Footpath B3/22/3 and residents at Pipes Farm would experience substantial changes to near distance views as a result of the Sheffield spur construction.	**Level of effect:** Major adverse (significant)

There would therefore be a high magnitude of visual change and major adverse visual effect.	
View south-west from Blackwell Footpath B3/6/2 **(VP 389-03-008) (Map Number LV-03-389)**	**Medium-high sensitivity visual receptors**
There would be middle distance views of construction activity for Hilcote east embankment (up to 19m in height), associated earthworks, construction equipment, movement of construction vehicles and material stockpiles. All would interrupt open views in the rolling landform. Blackwell Footpath B3/6/2 users would experience substantial changes to near-medium distance views as a result of construction of the HS2 main line. There would therefore be a high magnitude of visual change and major adverse visual effect.	**Level of effect:** Major adverse (significant)
View south-east from Blackwell Footpath B3/10/3 over M1 near Red Barn Farm **(VP 389-03-017) (Map Number LV-03-389)**	**Medium-high sensitivity visual receptors**
Construction of the Proposed Scheme, including the realignment of B6026 Huthwaite Lane, would be visible in the middle distance. To the east the view would be screened by the existing motorway bridge and foreground trees on the bridge embankments. The substantial change would be partially filtered by intervening vegetation. There would therefore be a medium magnitude of visual change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
View south-west from residences, B6026 Blackwell Road/ Blackwell Footpath B3/7/1 **(VP 389-02-014) (Map Number LV-03-389)**	**High sensitivity** **visual receptors**
From this edge of construction area location, there would be close distance views of construction of the Proposed Scheme including Hilcote east embankment and activities at B6026 Huthwaite Lane satellite compound, and close-middle distance views of the associated earthworks, construction equipment, and movement of construction vehicles. Footpath users and local residents would experience substantial changes to landscape character from the replacement of arable fields, scattered trees and hedgerows with construction elements and activities of the HS2 main line construction. Construction of the Sheffield spur close to its divergence from the HS2 main line would also be visible in the far distance. There would therefore be a high magnitude of visual change and major adverse visual effect.	**Level of effect:** Major adverse (significant)
View west from residences at Longside Cottage Farm and Sutton In Ashfield Bridleway 30 **(VP 389-02-016) (Map Number LV-03-389)**	**High sensitivity** **visual receptors**
From this edge of construction area location, land required for the construction of the Proposed Scheme (HS2 main line) would extend from the bridleway across the stream valley. Removal of hedgerows and trees, construction machinery and earthworks, would alter key characteristics of the existing view. Views would be dominated by construction of Hilcote east embankment (up to 19m in height). Vehicles using the construction traffic route would be visible moving in the foreground and across the valley. There would therefore be a high magnitude of visual change and major adverse effect.	**Level of effect:** Major adverse (significant)
View east from Blackwell Footpath B3/36/1 **(VP 389-03-015) (Map Number LV-03-389)**	**Medium-high sensitivity visual receptors**
Construction of the Proposed Scheme, including the realignment of the B6026 Huthwaite Lane and B6026 Huthwaite Lane satellite compound (to the south-east) would be seen in the near to middle distance. Moving vehicles using the construction traffic route would be visible across the view. Land use change, introduction of large scale earthwork operations, removal of hedgerows,	**Level of effect:** Major adverse (significant)

individual mature trees and streamside woodland for the HS2 main line would alter key characteristics of the existing view. Hilcote east embankment (up to 19m in height), would dominate the view. There would therefore be a high magnitude of visual change and major adverse effect.	
View south-west from Blackwell Footpath B3/13/2 & Silverhill Trail **(VP 390-03-001) (Map Number LV-03-390a)**	**High sensitivity visual receptors**
From this edge of construction area location, there would be close and middle-distance views of construction activity associated with Hilcote east embankment (up to 19m in height) and Tibshelf cutting. Vegetation would be removed revealing close distance views of construction vehicle movement, stockpiles, other construction elements, and construction for the Sheffield spur in the distance. Users of Blackwell Footpath B3/13/2 & Silverhill Trail would experience substantial changes to near distance views as a result of the HS2 main line construction. There would therefore be a high magnitude of visual change and major adverse effect.	**Level of effect:** Major adverse (significant)
View to south-east from Newtonwood Lane on bridge over M1 **(VP 390-04-002) (Map Number LV-03-390a)**	**Medium sensitivity visual receptors**
Users of Newtonwood Lane would have oblique views towards the construction of the Proposed Scheme, partially screened by an existing belt of trees alongside the M1. Characteristics of the existing view would be altered by construction of the HS2 main line requiring removal of hedgerows and trees across farmland and beside the Silverhill Trail. Construction activities, including Newtonwood Lane satellite compound, and vehicles using the construction route would be visible in the middle distance. There would therefore be a medium magnitude of visual change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
View eastwards from residences, Alfreton Road, Newton **(VP 440-02-004) (Map Number LV-03-440a)**	**High sensitivity visual receptors**
From this edge of construction area location, there would be close-middle distance views of Alfreton Road satellite compound and Newton east cutting, and close distance views of the associated earthworks, construction equipment, movement of construction vehicles and material stockpiles. Residents of A38 Alfreton Road would experience substantial changes to near distance views as a result of the Sheffield spur construction. There would therefore be a high magnitude of visual change and major adverse effect.	**Level of effect:** Major 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, minor roads 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:

- major adverse effects in relation to three LCAs;
- major adverse visual effects at six residential viewpoint locations;
- major adverse visual effects at six recreational viewpoint locations;
- moderate adverse visual effects at one recreational viewpoint location; and
- moderate adverse visual effects at one road user 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 Hilcote east embankment) and cuttings (such as Newton east cutting) into their wider landscape context and to mitigate views of structures and overhead line equipment from sensitive receptors, where reasonably practicable. Earthworks design also takes account of the relationship to surrounding land uses and management, such as agriculture;
- landscape mitigation planting to screen the route of the Proposed Scheme from nearby residential properties, in villages such as Hilcote, as well as other individual farmsteads, and recreational facilities such as long-distance recreational routes and other PRoW, such as Blackwell Footpath B3/6/1;
- compensatory woodland planting in areas of loss, using the same species composition and planting types (and appropriate planting density), such as woodland habitat creation to compensate for the partial loss of woodland along the Normanton Brook corridor, and to provide habitat connectivity, enhanced landscape/green infrastructure connectivity, as well connectivity of historic landscape features, where reasonably practicable, and to visually 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; compensation for loss of field ponds with new wetlands, ecological ponds and biodiversity wetland features and wetland enhancement in the Normanton Brook corridor.

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 the Normanton Brook east, central and west viaducts, the presence of earthworks and retaining walls, and a mid-point auto-transformer station. Other aspects include the presence of overhead line equipment.

Landscape assessment

11.5.4 Based on the current design, it is currently anticipated that the LCAs described in Table 30 would be significantly affected during operation of the Proposed Scheme.

Table 30: Operational phase significant landscape effects

South Normanton and Hilcote Urban Fringe Farmlands	**Medium susceptibility and sensitivity**
Susceptibility to change: The relatively open character of the landscape and its rural qualities, albeit with urban influences, impart a medium susceptibility to change arising from the Proposed Scheme. **Year 1:** The Proposed Scheme would create changes to the undulating landform as a result of: the Cartwright Lane cutting (up to 27m in depth) through the ridgeline of the A38 Alfreton Road; the Normanton Brook west and east embankments (up to 13m in height); the Hilcote west and east embankments (up to 19m in height); and the Hilcote cutting where the Sheffield spur meets the high ground of the M1. These are permanent changes altering the characteristics of the LCA. Direct landscape impacts would result from removal of characteristic features of agricultural land, hedgerows, scrub and woodland, creating a wide corridor of more open landscape. Proposed replacement planting would not be sufficiently established to provide mitigation for that loss. Tall structures including the three high Normanton Brook west, central and east viaducts (up to 16m in height), as well as the Cartwright Lane dive under, and other design elements such as overhead line equipment would be prominent, uncharacteristic features of the landscape. Train movement and noise would reduce tranquillity in the LCA. A large proportion of the LCA would be changed by the Proposed Scheme, comprising the HS2 main line and the Sheffield spur. There would therefore be a high magnitude of change and major adverse effect.	**Level of effect:** Major adverse (significant)
Year 15: Landscape mitigation planting, woodland habitat creation and hedgerow planting would assist with some integration of earthworks and structures by the summer of year 15. Areas of wetland habitat creation proposed adjacent to the Normanton Brook, and beneath the Normanton Brook west, central and east viaducts, would help to mitigate for loss of vegetation. Normanton Brook west, central and east viaducts (up to 16m in height), and prominent large earthworks would form uncharacteristic features in the landscape with residual adverse impacts. The HS2 main line in particular, along the valley side, would form an unnatural landform feature. Once established, the proposed mitigation would therefore reduce the magnitude of change on the landscape to medium, with moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
Newton and Blackwell Coalfield Village Farmlands	**Medium susceptibility and**

	sensitivity
Susceptibility to change: The undulating landform, presence of historic buildings within the Old Blackwell Conservation Area, and rural character albeit with urban influences, impart a medium susceptibility to change arising from the Proposed Scheme. **Year 1:** Newton east and Newton west cuttings (up to 12m in depth) would result in substantial changes to the undulating landform and create permanent landscape severance. Old Blackwell and Alfreton Road retaining walls would be large engineering structures uncharacteristic of the surroundings. Other infrastructure elements such as noise fences and overhead line equipment would combine with those of the M1, changing the predominantly rural characteristics of the LCA. Train movement and noise would reduce tranquillity. The Old Blackwell Conservation Area would be adversely affected by the Sheffield spur through severance, loss of three buildings, the closure of B6026 Cragg Lane and removal of through-traffic. There would be wider impacts on its setting. Proposed landscape mitigation planting would not have established at year 1 and would not provide screening or landscape integration at this stage. Overall there would therefore be a high magnitude of change and major adverse effect.	**Level of effect:** Major adverse (significant)
Year 15: Areas of landscape mitigation planting, woodland habitat creation and hedgerow planting would assist with some integration of earthworks and structures by the summer of year 15. However, the presence of the operational railway, and particularly the large-scale cuttings and prominent structures within the village of Old Blackwell and its conservation area would remain as uncharacteristic, intrusive features in the rural landscape. There would also be residual adverse effects on the surroundings and landscape setting of Newton and Blackwell. There would therefore remain an overall high magnitude of change and major adverse effect.	**Level of effect:** Major adverse (significant)
Newton and Blackwell Urban Area	**Medium susceptibility and sensitivity**
Susceptibility to change: The presence of historic buildings within Newton Conservation Area and the continuous nature of the ridgeline settlement of Newton and Blackwell impart a medium susceptibility to change arising from the Proposed Scheme. **Year 1:** The Sheffield spur would create permanent changes in landform, introducing the Alfreton Road box structure and both the Newton west and east cutting through the ridgeline. The landscape would also incur direct impacts as a result of the removal of characteristic features of houses and their gardens, and loss of adjacent agricultural land and hedgerow boundaries. Structures, such as the Alfreton Road retaining wall, and elements such as overhead line equipment would be uncharacteristic features on the edge of the settlement. Train movement and associated noise would reduce the level of tranquillity in the LCA. At year 1, areas of planting would not be sufficiently established to provide mitigation. There would therefore be a high magnitude of change and major adverse effect.	**Level of effect:** Major adverse (significant)
Year 15: Substantial landscape mitigation planting is proposed on both sides of the Sheffield spur, including the area occupied by the Alfreton Road satellite compound during construction. Where the Sheffield spur would pass between Newton and Blackwell, the loss of properties would leave a gap in the rows of housing on either side of Alfreton Road. There would be a permanent change to settlement character and pattern with new gaps in the lines of roadside housing. Structures, such as the Alfreton Road retaining wall, and elements such as overhead line equipment would remain as intrusive features on the edge of the settlement. Large areas of proposed mitigation planting would screen the Proposed Scheme, but change the nature	**Level of effect:** Moderate adverse (significant)

of views out of the settlement, providing more enclosure, and preventing some views to the wider landscape. Severance in the landscape and loss of connectivity would remain. In year 15, with establishment of the proposed mitigating planting, the magnitude of change on the landscape would reduce to medium, with moderate adverse effect.	

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 31 identifies the locations where the operation of the Proposed Scheme would potentially result in significant effects. These locations are shown in Map Series LV-04 in the Volume 2: LA08 Map Book.

Table 31: Operation phase significant visual effects

View from Sutton-In-Ashfield Bridleway 60 at junction with Brookhill Lane **(VP 388-03-002) (Map Number LV-04-388)**	**Medium-high sensitivity visual receptors**
Year 1 – winter and summer: During operation of the Proposed Scheme at year 1, bridleway users would experience substantial changes to the existing view from the Proposed Scheme and realignment of Brookhill Lane (in cutting across the middle distance of the view to pass beneath Maghole Brook viaduct). A new hedgerow would be visible along the northern edge of the cutting but would not contribute to screening at this stage. High-sided vehicles would be partially visible within the cutting. The Maghole Brook viaduct (up to 18m in height) and Brookhill Lane embankment would be visible in the background. Trains and overhead line equipment would be visible on the Maghole Brook viaduct, near to the skyline. Landscape earthworks would screen views of trains on the Brookhill Lane embankment, although overhead line equipment would be visible above the earthworks. The Proposed Scheme would create an uncharacteristic large-scale feature extending across part of the view, near the skyline. Landscape mitigation planting would not yet contribute to any visual screening, integration or enclosure in both winter and summer of year 1. Loss of mature hedgerows and trees would also change the character of the existing view. There would therefore be a high magnitude of visual change and major adverse effect.	**Level of effect:** Major adverse (significant)
Year 15 – summer: By the summer of year 15, views of the Proposed Scheme would be partially screened by establishing landscape mitigation planting. The cutting of the realigned Brookhill Lane would be screened by the maturing hedge in the foreground. The Maghole Brook viaduct and Brookhill Lane embankment would be visible in the background, partially screened by the maturing landscape mitigation planting in the mid-ground, which would change the land-cover and the characteristics of the views. There would therefore be a reduction to a medium magnitude of visual change with moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
View east from Pinxton Footpath B8/1/1 beside Farmwell Lane **(VP 388-03-003) (Map Number LV-04-388)**	**Medium-high sensitivity visual receptors**

Year 1 – winter and summer: Users of the recreational footpath would have open views to the Proposed Scheme across the near-to middle distance. Brookhill Lane embankment and Farmwell Lane underbridge would be prominent features. Landscape earthworks at Brookhill Lane embankment would screen trains for the most part, although overhead line equipment would remain visible. The skyline would be altered due to tree loss and landform change. Changes to the view from the footpath would be permanent and substantial in both winter and summer of year 1 due to new features and components, continuously highly visible across the majority of the view and uncharacteristic with existing open farmland. There would therefore be a high magnitude of change in the view, and major adverse effect.	**Level of effect:** Major adverse (significant)
Year 15 – summer: Landscape mitigation planting would be established and maturing to provide partial screening around Farmwell Lane underbridge and Brookhill Lane embankment. Farmwell Lane underbridge would remain visible as a prominent element in the landscape in the middle distance. There would therefore be a reduction to a medium magnitude of visual change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
View north-east from Blackwell Trail **(VP 389-03-001) (Map Number LV-04-389)**	**High sensitivity visual receptors**
Year 1 – winter and summer: Users of the Blackwell Trail would experience substantial changes to middle distance and distant views due to tree loss and introduction of new landforms and the large-scale structures of Normanton Brook west embankment (up to 12m in height) and Normanton Brook west viaduct (up to 16m in height). These would be continuously highly visible across the majority of the view in both winter and summer of year 1, and would be uncharacteristic with the existing view from the Blackwell Trail. Retained foreground hedgerow trees would filter views towards Hilcote west embankment (up to 13m in height). The trains would be visible on Normanton Brook west embankment and Normanton Brook west viaduct but would be screened from view by landscape earthworks at Hilcote west embankment. There would therefore be a high magnitude of visual change and major adverse effect.	**Level of effect:** Major adverse (significant)
Year 15 – summer: The landscape mitigation planting would have established and would be maturing to provide partial screening in the area to either side of the Blackwell Trail. There would be a wetland habitat creation area to the centre of the view, extending to the Proposed Scheme. Normanton Brook west embankment and Normanton Brook west viaduct would remain as prominent elements in the centre of the view. There would therefore remain a high magnitude of visual change and major adverse effect.	**Level of effect:** Major adverse (significant)
View east from residences, B6406 New Lane, Hilcote **(VP 389-02-005) (Map Number LV-04-389)**	**High sensitivity visual receptors**
Year 1 – winter and summer: Residents would experience substantial changes to the existing view as a result of the Proposed Scheme. Mature vegetation including the foreground hedgerow and distinctive hedgerow trees in the middle distance, which currently frame, filter and punctuate the view, would be lost. The Sheffield spur would run obliquely across the middle distance of the view, on the Hilcote west embankment (up to 13m in height), passing into the Hilcote cutting. Landscape earthworks would partially screen views of trains, although overhead line equipment would be visible above the landform, appearing against the skyline for the most part of the view. The earthworks would introduce a large-scale feature extending across and foreshortening the view. A proposed balancing pond, with engineered slopes and vehicle access for maintenance, would form a prominent feature in the foreground. B6046 New Lane underbridge would be a noticeable structure beyond the balancing pond, in the middle distance. Landscape mitigation planting would not contribute to visual screening in both winter and summer of year 1. There would therefore be a high magnitude of visual change and major adverse effect.	**Level of effect:** Major adverse (significant)

Year 15 – summer: By the summer of year 15, views of the landscape earthworks, overhead line equipment and the movement of trains would be partially screened by maturing landscape mitigation planting in the middle distance. The balancing pond would be partially screened by hedgerow planting but would remain as a prominent feature in the foreground. B6046 New Lane underbridge would remain as a noticeable structure beyond the balancing pond, in the middle distance. There would therefore be a reduction to a medium magnitude of change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
View north-east from residences, B6026 Huthwaite Lane **(VP 389-02-007) (Map Number LV-04-389)**	**High sensitivity visual receptors**
Year 1 – winter and summer: Occupants of properties on B6026 Huthwaite Lane would experience substantial changes to near distance views as result of the Sheffield spur, which would run in Newton east cutting. This cutting would be deep enough to hide movements of trains and overhead line equipment (approximately 12m below ground level at its deepest point in this section). Vegetation loss and property demolition would change the character of views, within the conservation area. Mitigation planting would mitigate views, but would not contribute to any visual integration at this stage in either winter or summer of year 1. There would therefore be a high magnitude of visual change and major adverse effect.	**Level of effect:** Major adverse (significant)
Year 15 – summer: The small areas of landscape mitigation planting would help to infill gaps caused by demolition of properties. However, key characteristics of the view and the sense of place would remain changed due to the loss of buildings and the modification of the conservation area. There would therefore remain a high magnitude of visual change and major adverse effect.	**Level of effect:** Major adverse (significant)
View from residences, B6026 Huthwaite Lane at start of Blackwell Footpath B3/22/3 **(VP 389-02-009) (Map Number LV-04-389)**	**High sensitivity visual receptors**
Year 1 – winter and summer: Wider views would be obscured by near distance views of the Sheffield spur that runs in Newton east cutting and crosses under the M1 in the M1 Blackwell box structure, as well as by the B6026 Cragg Lane realignment. A proposed balancing pond, with engineered slopes and vehicle access for maintenance, would form a prominent feature in the foreground. The Sheffield spur would highly alter the appearance of the landscape and would represent an uncharacteristic feature in the views in both winter and summer of year 1. There would therefore be a high magnitude of visual change and major adverse visual effect.	**Level of effect:** Major adverse (significant)
Year 15 – summer: Limited planting is possible at this location. There would therefore remain a high magnitude of visual change and major adverse effect.	**Level of effect:** Major adverse (significant)
View south-west from Blackwell Footpath B3/6/2 **(VP 389-03-008) (Map Number LV-04-389)**	**Medium-high sensitivity visual receptors**
Year 1 – winter and summer: There would be middle distance views of the HS2 main line on Hilcote east embankment (up to 19m in height). Landscape mitigation earthworks would screen views of trains for the most part, but overhead line equipment and the upper section of trains would still be noticeable. The earthworks would alter the appearance of the landscape interrupting characteristics of the open views in the undulating rising landform. The landscape mitigation planting associated with the landscape earthworks would not contribute to any visual integration in either winter or summer of year 1. There would therefore be a high magnitude of visual change and major adverse effect.	**Level of effect:** Major adverse (significant)
Year 15 – summer: By summer of year 15, views of the HS2 main line would be partially screened by the established mitigation planting. However, mitigation planting would change the land cover and character of views, and the characteristics of open views would be lost.	**Level of effect:** Moderate adverse (significant)

There would therefore be a reduction to a medium magnitude of visual change and moderate adverse effect.	
View south-east from Blackwell Footpath B3/10/3 over M1 near Red Barn Farm **(VP 389-03-017) (Map Number LV-04-389)**	**Medium-high sensitivity** **visual receptors**
Year 1 – winter and summer: Public footpath users would experience noticeable changes in views due to loss of vegetation and addition of the new embankments of the HS2 main line. Hilcote east embankment (up to 13m in height in this location) would be visible as a substantial change across a small part of the view; the remainder partially screened by the existing trees in the foreground. Landscape earthworks would screen views of trains for the most part, although the overhead line equipment would be visible in both winter and summer of year 1. The embankment and adjoining strip of land would be newly planted with an area of landscape mitigation planting which would not provide any screening at this stage. There would therefore be a medium magnitude of visual change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
Year 15 – summer: Established and maturing mitigation planting would provide partial screening of the Proposed Scheme. There may still be a substantial change to view from Red Barn Farm. For users of the public footpath the view would be largely filtered by intervening vegetation and viewed obliquely from the bridge, however, views from the residential property would still be affected. There would therefore be a low magnitude of visual change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
View south-west from residences, B6026 Blackwell Road/ Blackwell Footpath B3/7/1 **(VP 389-02-014) (Map Number LV-04-389)**	**High sensitivity visual receptors**
Year 1 – winter and summer: Residents and footpath users would experience substantial changes to the view as a result of the HS2 main line on Hilcote east embankment (up to 7m in height). Landscape earthworks would mostly screen views of the operational railway, and would block views beyond the middle distance. Train movement, overhead line equipment and other associated elements would be visible above landscape earthworks. The HS2 main line would create an uncharacteristic large-scale feature extending across part of the view in both winter and summer of year 1. Planting would not contribute to visual integration at this stage. A balancing pond and access road would form a prominent feature in the foreground. There would therefore be a high magnitude of visual change and major adverse effect.	**Level of effect:** Major adverse (significant)
Year 15 - summer: By summer year 15 the landscape earthworks and trains would be partially screened by the established mitigation planting. However, the Hilcote east embankment would remain as a prominent uncharacteristic feature in the view. The balancing pond and access road would still form a prominent feature in the foreground of the view. There would therefore be a reduction to a medium magnitude of visual change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
View west from residences at Longside Cottage Farm and Sutton In Ashfield Bridleway 30 **(VP 389-02-016) (Map Number LV-04-389)**	**High sensitivity visual receptors**
Year 1 - winter and summer: The Proposed Scheme would occupy the line of view in the near- to middle-ground on the high Hilcote east embankment (up to 19m). Trains and overhead line equipment would be visible. Earthworks would dominate the view and obstruct existing views to the west. There would be oblique views to the B6026 Huthwaite Lane underbridge and also a balancing pond with engineered slopes and access road. There would be a substantial change to direct and oblique views for bridleway users and from nearby residential properties, due to loss of vegetation including mature trees and hedgerows, the	**Level of effect:** Major adverse (significant)

introduction of large engineering structures, and loss of farmland views. These changes would occur at both winter and summer of year 1. There would therefore be a high magnitude of visual change and major adverse effect.	
Year 15 – summer: The landscape mitigation planting would have established and would be maturing (approximately 7.5m in height) to provide partial screening of the Proposed Scheme from the public bridleway. There would therefore be a reduction to a medium magnitude of change in the view and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
View east from Blackwell Footpath B3/36/1 **(VP 389-03-015) (Map Number LV-04-389)**	**Medium-high sensitivity visual receptors**
Year 1 - winter and summer: Footpath users would experience substantial changes to middle and distant views due to the loss of trees and introduction of new landforms and structures. Hilcote East embankment would extend across much of the existing view. Trains would be mostly screened by earthworks, but with oblique glimpses at each end. The embankment would form a new, large-scale, uncharacteristic feature altering key characteristics of the existing view. The realigned B6026 Huthwaite Lane would be closer to the viewpoint. These changes would occur at both winter and summer of year 1. There would therefore be a high magnitude of visual change and major adverse effect.	**Level of effect:** Major adverse (significant)
Year 15 – summer: Established and maturing landscape mitigation planting would provide partial screening of the Proposed Scheme across the field of view. The realigned B6026 Huthwaite Lane would be partially screened by hedgerow planting. High-sided vehicles would be visible above the hedge. Earthworks would remain a noticeable change to a key characteristic of the view for footpath users at this location. There would therefore be a reduction to a medium magnitude of visual change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
View south-west from Blackwell Footpath B3/13/2 & Silverhill Trail **(VP 390-03-001) (Map Number LV-04-390a)**	**High sensitivity visual receptors**
Year 1 – winter and summer: There would be middle-distance views of the HS2 main line that runs on Hilcote east embankment (up to 19m in height) and Tibshelf cutting in this section. Overhead line equipment and movement of trains would be partially screened within Tibshelf cutting (approximately 5m in depth at the Silverhill Trail) and by landscape earthworks immediately either side of the Silverhill Trail. These changes would occur at both winter and summer of year 1. Mitigation planting would not contribute to any visual integration at this stage, so the operational railway would result in a noticeable change to part of the view. The HS2 main line would alter the appearance of the landscape and would represent an uncharacteristic feature in the views. There would therefore be a medium magnitude of visual change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
Year 15 – summer: Due to the maturing vegetation, effects would reduce to non-significant by year 15.	**Level of effect:** Non-significant
View to south-east from Newtonwood Lane on bridge over M1 **(VP 390-04-002) (Map Number LV-04-390a)**	**Medium sensitivity visual receptors**
Year 1 - winter and summer: Drivers of vehicles on Newtonwood Lane would obtain oblique transient views of the HS2 main line, filtered by existing foreground trees. Hilcote east embankment, Tibshelf cutting and Silverhill Trail overbridge, would be noticeable in the middle distance, particularly in winter of year 1. Newtonwood Lane realignment would alter forward views. There would be substantial change partially filtered by intervening vegetation, viewed obliquely from the visual receptor. There would therefore be a medium magnitude of visual change and a moderate adverse effect.	**Level of effect:** Moderate adverse (significant)

Year 15 – summer: Maturing vegetation would reduce effects to non-significant by year 15.	**Level of effect:** Non-significant
View eastwards from residences, Alfreton Road, Newton **(VP 440-02-004) (Map Number LV-04-440a)**	**High sensitivity visual receptors**
Year 1 – winter and summer: Landscape earthworks would screen oblique, medium distance views of the Proposed Scheme in Newton east cutting, but overhead line equipment and glimpses of the upper section of trains would still be noticeable. Earthworks would alter the appearance of the landscape interrupting the characteristics of open views. These changes would occur at both winter and summer of year 1. Landscape mitigation planting associated with the landscape earthworks would not contribute to any visual integration at this stage. There would therefore be a high magnitude of visual change and major adverse effect.	**Level of effect:** Major adverse (significant)
Year 15 - summer: By summer of year 15, views of the Proposed Scheme would be partially screened by the established mitigation planting. However, mitigation planting would change the land cover and character of views, and the characteristics of open views would be lost. There would therefore be a reduction to a medium magnitude of visual change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)

Other mitigation measures

11.5.8 The permanent effects of the Proposed Scheme on landscape and visual receptors have been 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, including use of materials, would be considered as part of the ongoing development of contextual 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, the following likely residual significant effects would remain following year 15 of operation:

- major adverse effects in relation to one LCA;
- moderate adverse effects in relation to two LCAs;
- major adverse visual effects at two residential viewpoint locations;
- moderate adverse visual effects at four residential viewpoint locations;
- major adverse visual effects at one recreational viewpoint locations; and
- moderate adverse visual effects at five recreational viewpoint locations.

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 Pinxton to Newton and Huthwaite 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 Pinxton to Newton and Huthwaite 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 Ashfield District Council (ADC) 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: LA08 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 Scope and Methodology Report (SMR)[116].

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.

12.3 Environmental baseline

Existing baseline

Study area description

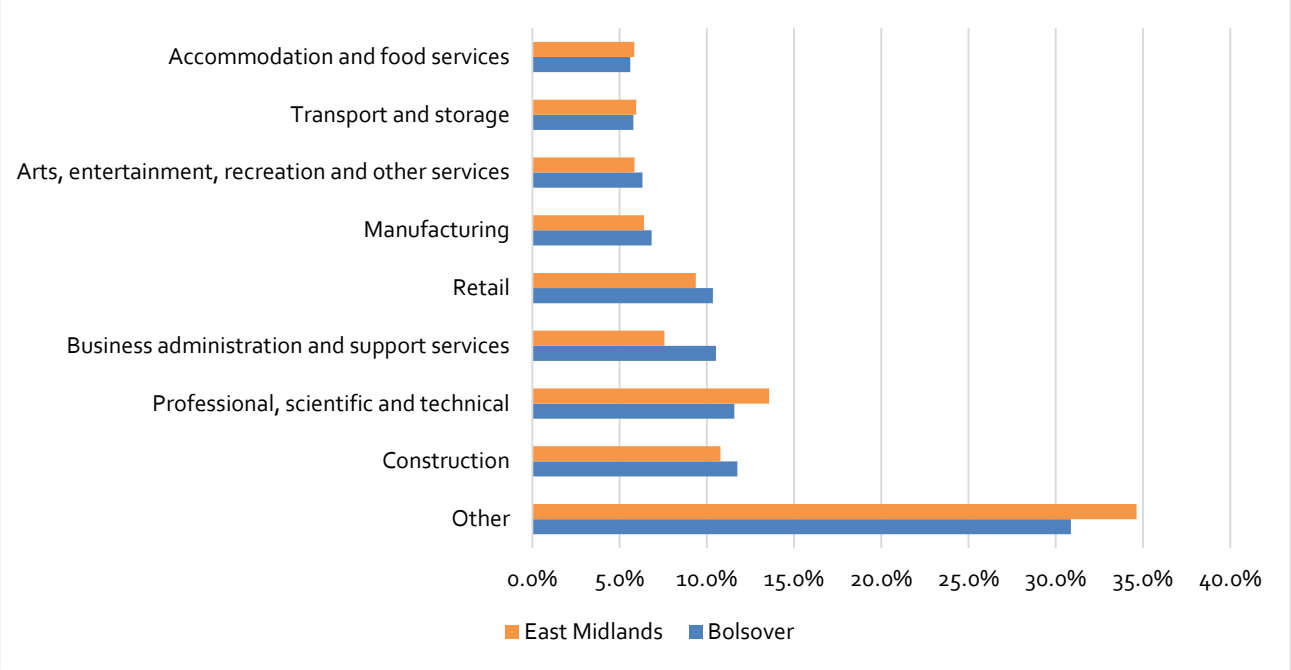
12.3.1 The following provides a brief overview of employment, economic structure, labour market and business premises availability within the Pinxton to Newton and Huthwaite area. It lies within the administrative areas of BDC and ADC. As the Community area lies predominantly within the BDC administrative area the baseline is only reported for BDC. It also falls within the Sheffield City region Local Enterprise Partnership (LEP) area[117] and East Midlands region.

[116] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report
[117] Stoke-on-Trent and Staffordshire Local Enterprise Partnership, (2014), Strategic Economic Plan Summary March 2014. Available online at: https://www.stokestaffslep.org.uk/app/uploads/2014/07/140708-Stoke-and-Staffs-Economic-Plan-Summary.pdf

Business and labour market

12.3.2 Within the BDC area there is a wide spread of business types, reflecting a diverse range of commercial activities. The construction sector accounts for the largest proportion of businesses (12%), with professional, scientific and technical the second largest (12%) followed by business administration and support services (11%). This is shown in Figure 8. For comparison within the East Midlands region, the largest sectors were professional, scientific & technical (14%), followed by construction (11%) and retail (9%)[118].

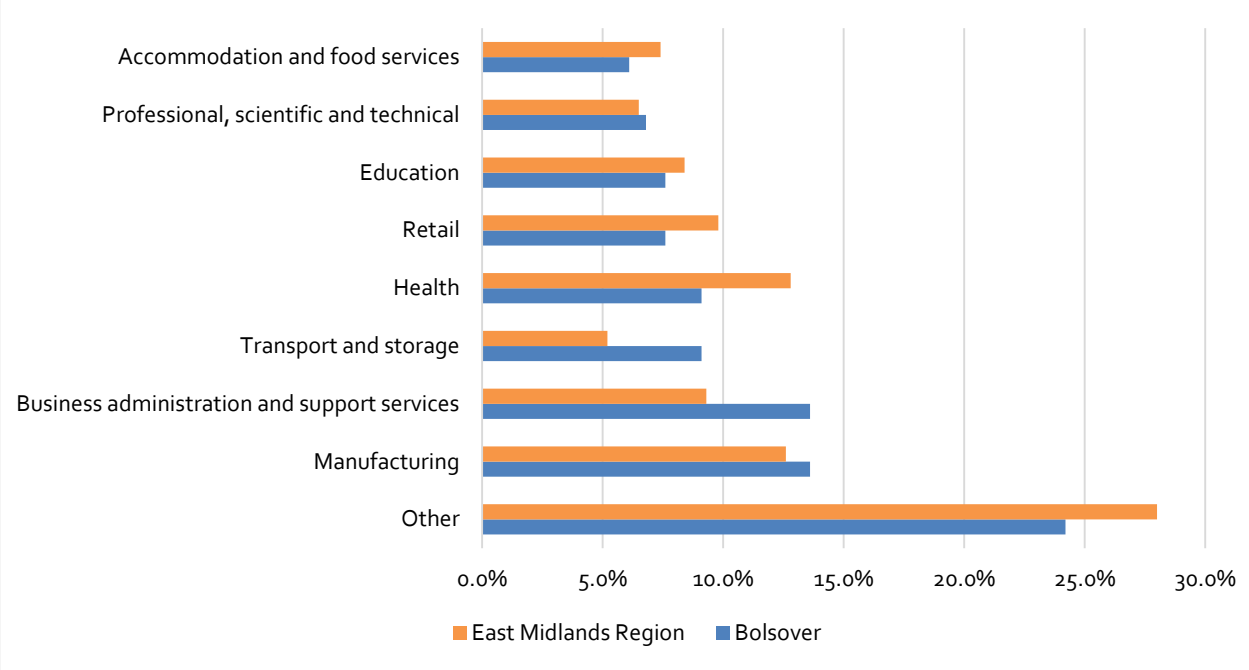
Figure 8: Business sector composition in Bolsover District Council area and the East Midlands region [119]



12.3.3 In 2016[120], approximately 36,600 people worked in the BDC area. According to the Office for National Statistics Business Register and Employment Survey 2017, the top five sectors in terms of share of employment in the BDC area were: manufacturing (14%), business administration and support services (13.6%); transport and storage (9%); health (9.1%); and retail (7.6%). These compare with the top five sectors for the East Midlands region, which were: manufacturing (13%); health (13%); retail (10%); business administration and support (9%); and education (8%). This is shown in Figure 9.

[118] Office for National Statistics (ONS) (2015) *UK Business count –Local Units.* Available online at: https://www.nomisweb.co.uk
[119] "Other" includes: Information & communication; Manufacturing; Wholesale; Transport & storage (including postal); Motor trades; Property; Education; Financial & insurance; Public administration & defence; Mining, quarrying & utilities.
[120] Office for National Statistics (ONS) (2015) *Business Register and Employment Survey*. Available online at: http://www.nomisweb.co.uk, This number includes both residents and non-residents of BDC who work within its boundaries.

Figure 9: Employment by industrial sector in the Bolsover District Council area and the East Midlands region



12.3.4 According to the Annual Population Survey (2016)[121], the employment rate[122] within the BDC area was 75% (36,600 people), which is more than that recorded for both the East Midlands (75%) and England (74%). In 2016, unemployment[123] in the BDC area was 4%, which was less than that recorded both for the East Midlands (4%) and England (5%).

12.3.5 According to the Annual Population Survey (2016)[124], 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 and 38% in England, while 8.2% of residents had no qualifications, which was higher than that recorded both for East Midlands (8%) and England (8%).

Property

12.3.6 A review of employment land in 2015 identified a need for 15,360m2 of offices (B1a/b) and 18,800m2 of warehousing/distribution (B8) net floor space per year to 2033 for the BDC area. There has been an historic low level provision of office space in the BDC area up until 2012[125]. It is estimated that the District's pipeline supply currently comprises of just under 105ha of land in gross terms at sites in Pinxton and South

[121] Office for National Statistics (ONS) (2016) *Annual Population Survey*, NOMIS. Available online at: http://www.nomisweb.co.uk
[122] The proportion of working age (16-64 year olds) residents that is in employment.
[123] 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.
[124] Office for National Statistics (ONS) (2016) *Annual Population Survey*, NOMIS. Available online at: http://www.nomisweb.co.uk
[125] Bolsover District Council (2015) *Bolsover Economic Development Assessment*. Available online at: https://www.bolsover.gov.uk/images/LIVE/P/Plan_EB_EDNA_report.pdf

Normanton, Shirebrook, Cresswell and Whitwell, Bolsover and Barlborough providing key opportunities for employment growth[126].

12.3.7 The average vacancy rate for industrial and warehousing property in the BDC area has been assessed as 4% based on marketed space against known stock[127].

12.3.8 Based upon the latest available data from the Estates Gazette (October 2017[128]) there is 6,000 m2 of office space and 37,000 m2 of industrial space available in the BDC area.

12.4 Effects arising during construction

Avoidance and mitigation measures

12.4.1 The draft Code of Construction Practice (CoCP)[129] includes a range of provisions 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).

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

[126] Bolsover District Council (2015) *Bolsover Economic Development Assessment*. Available online at: https://www.bolsover.gov.uk/images/LIVE/P/Plan_EB_EDNA_report.pdf
[127] 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).
[128] Based on marketed space identified from Estates Gazette data (EGi) (March 2018). Available online at: https://www.egi.co.uk/Property/Availability/
[129] Supporting document: Draft Code of Construction Practice

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

Construction employment

12.4.3 It is currently anticipated that there would be two main construction compounds at Farmwell Lane and Sheffield spur, and five satellite compounds in the Pinxton to Newton and Huthwaite area. These sites could result in the creation of up to 7,418 person years of construction employment opportunities[130], broadly equivalent to 742 full-time jobs[131], 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).

12.4.4 Direct construction employment could also lead to opportunities for local businesses to form part of the supply chain for 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).

12.4.5 The resulting effects on employment are reported in aggregate at a route-wide level (see Volume 3: Route-wide effects).

Permanent effects

Businesses

12.4.6 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.

12.4.7 Overall, three business accommodation units or sites in the study area would experience direct impacts as a result of the Proposed Scheme. These three units or sites, together, form three defined resources and provide three jobs. These are as follows:

- The Hideaway, Pasture Lane (one business unit);
- Robin Hood, Huthwaite Lane, Blackwell (one business unit); and
- Land South East of The Hideaway, Pasture Lane (one business unit).

[130] 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.
[131] Based on the convention that 10 employment years is equivalent to one full time equivalent job.

12.4.8 It is currently anticipated that no businesses would experience significant, permanent direct effects as a result of construction of the Proposed Scheme.

Significance of effects

12.4.9 Taking account of the sensitivity of the resource and the magnitude of impact, it is currently anticipated that there would be no significant impacts on employment. It should be noted that a precautionary approach has been taken in this assessment as outlined in Section 1.2 and it may change by the time of the formal ES.

12.4.10 Across all of the employment areas reviewed, it is currently anticipated that an estimated three jobs[132] would either be displaced or possibly lost within the Pinxton to Newton and Huthwaite area. There is a reasonable probability that businesses would be able to relocate to places that would still be accessible to 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 District authority (approximately 55,500 jobs) and the scale of economic activity and opportunity in the 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 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.

[132] 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.

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 anticipated 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 Pinxton to Newton and Huthwaite 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 Pinxton to Newton and Huthwaite 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[133]; and
- 'non-residential receptors'[134] such as:

- community facilities including schools, hospitals, places of worship and 'quiet areas'[135]; 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[136], planning policy, planning practice guidance on noise (PPGN) [137] and EIA Regulations as described in the Scope and Methodology Report[138] (SMR).

13.1.3 Engagement has been undertaken with Bolsover District Council (BDC) and Ashfield District Council (ADC) 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 Pinxton to Newton and Huthwaite 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

[133] '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.
[134] 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.
[135] '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.
[136] Noise Policy Statement for England (2015) Department for Environment, Food & Rural Affairs (Defra).
[137] Planning Practice Guidance – Noise (2014) Department for Communities and Local Government (DCLG). Available online at: https://www.gov.uk/guidance/noise--2
[138] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

(Map series SV-01), can be found in the Volume 2: LA08 Map Book. Map series SV-01 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 Pinxton to Newton and Huthwaite area comprises a mix of rural and urban areas and land uses. The area also includes a number of industrial estates and a retail park. The sound environment is generally dominated by local and distant road traffic and local neighbourhood sources, with contributing natural and agricultural sounds.

13.3.3 There are a number of main roads that contribute to the sound environment within the Pinxton to Newton and Huthwaite area. The M1 passes through the area in a south-north orientation, and the A38 Alfreton Road runs from west to east,

connecting the M1 with Sutton-in-Ashfield and Mansfield. The A38 also provides access to a number of industrial estates and to the East Midlands Designer Outlet in South Normanton.

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[139], Roads[140] or Railways[141]. HS2 Ltd will engage with the Competent Authorities responsible for the relevant Important Areas. Map Series SV-01 (Volume 2: LA08 Map Book) shows any noise Important Areas in the Pinxton to Newton and Huthwaite 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)[142]. 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 The following assumption has also been made in relation to the construction methods specific to the Pinxton to Newton and Huthwaite area.

13.4.3 The A38 box structures and the M1 Blackwell box structure involve construction works in proximity to the A38 Alfreton Road and to the M1 respectively, including construction of the piling platform, pile cap construction and installation of beams and concreting. Some works may be undertaken during the evening or night-time.

13.4.4 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.

[139] Noise Action Plan: Agglomerations (large urban areas) (2014) Department for Environment, Food & Rural Affairs (Defra).
[140] Noise Action Plan: Roads (including major roads) (2014) Department for Environment, Food & Rural Affairs (Defra).
[141] Noise Action Plan: Railways (including major railways) (2014) Department for Environment, Food & Rural Affairs (Defra).
[142] Supporting document: Draft Code of Construction Practice

Avoidance and mitigation measures

13.4.5 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[143].
- 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 would seek to obtain prior consent from the relevant local authority under Section 61 of the CoPA for the proposed construction works. The consent application would 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; and
- contractors would be required to comply with the terms of the draft CoCP and appropriate action would be taken by the nominated undertaker as required to ensure compliance.

13.4.6 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.

[143] Including local businesses and quiet areas designated by the local authority.

13.4.7 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

13.4.8 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: LA08 Map Book):

- South Normanton, north-east of the M1 junction 28, arising from construction activities such as cutting formation and landscape bund construction;
- Hilcote, arising from construction activities such as cutting formation, road realignment, embankment formation, bridge construction, landscape bund construction and balancing pond construction;
- Old Blackwell, arising from construction activities such as retaining wall, cutting formation, overbridge construction, road realignment, landscape bund construction and balancing pond construction;
- Blackwell, arising from construction activities such as cutting formation, landscape bund construction and balancing pond construction; and
- Newton, arising from construction activities such as retaining wall, cutting formation, road realignment/diversion, cut and cover tunnel construction, landscape bund construction and balancing pond construction.

13.4.9 Map Series SV-01 (Volume 2: LA08 Map Book) shows key non-residential properties that have been identified within the study area as defined in the SMR. Of these, St Werbergh's Church, Old Blackwell is likely to experience significant effects (to be confirmed in the formal ES).

13.4.10 The avoidance and mitigation measures to be implemented would avoid airborne construction noise adverse likely significant effects. Residual temporary noise or vibration likely significant effects will be reported in the formal ES.

13.4.11 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 B6018 Park Lane in Selston, from the works along the B6018 Mansfield Road, turning right towards Commonside and continuing towards Station Road, Beaufit Lane and the B6019 Town Street in Pinxton, then to the B6019 Alfreton Road and the B6019 Pinxton Lane in South Normanton, and finally turning right towards the B6019 Mansfield Road up to junction 28 of the M1;
- the B6027 Common Road in Huthwaite; and
- the B6026 Blackwell Road in Huthwaite along B6026 Huthwaite Lane up to the B6026 Cragg Lane in Old Blackwell.

13.4.12 The magnitude and extent of effect will depend on the level of construction traffic using the road. Residual significant temporary noise or vibration effects will be reported in the formal ES.

Other mitigation measures

13.4.13 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

13.4.14 Further work is being undertaken to confirm significant construction noise and vibration effects, including temporary indirect effects from construction traffic.

13.4.15 Non-residential receptors identified at this stage as potentially subject to construction noise or vibration effects will be further considered, where necessary, on a receptor-by-receptor basis. Likely significant effects will be reported in the formal ES.

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 2.2 and 2.4 of this report and in Volume 1, Sections 4 and 8 and 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 Pinxton to Newton and Huthwaite area.

13.5.2 Passenger services will 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 will progressively increase to 11 trains per hour in each direction on the main lines south of the Sheffield spur with an operating speed of 330kph for 90% of services and 360kph for 10% of services; on the main line north of the Sheffield spur up to 9 trains per hour in each direction will operate at the same speeds; and on the Sheffield spur up to 4 trains per hour in each direction will operate at speeds between 200kph and 220kph. This number of services is assumed to operate every hour from 07:00 to 21:00. The number of services will progressively decrease after 21:00 and the last service will arrive at terminal stations by midnight. Further information 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 will enable the railway to be quieter than implied by current minimum European standards. Details of operational train noise will be provided in the formal ES. This will include reduction of aerodynamic noise from the pantograph that otherwise would occur above 300kph (186mph) with current pantograph designs, drawing on proven technology in use in East Asia where reasonably practicable. 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[144].

13.5.6 The Proposed Scheme would incorporate noise barriers to avoid or reduce significant adverse airborne noise effects. The envisaged noise barrier locations based upon the currently available information are shown on Map Series SV-01 (Volume 2: LA08 Map Book) and described in Section 2.2.

13.5.7 Noise effects would also be reduced in other locations along the route by engineering structures and landscape earthworks provided to avoid or reduce significant visual effects.

13.5.8 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[145] 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[146] or the maximum noise level criteria[147] 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

13.5.9 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

13.5.10 Map Series SV-01 (Volume 2: LA08 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

[144] Technical Specification for Interoperability (TSI) Noise – EU Commission Regulation No 1304/2014.
[145] Following Government's Planning Practice Available online at: https://www.gov.uk/government/collections/planning-practice-guidance.
[146] Night time Noise Guidelines for Europe (2010) World Health Organization.
[147] Dependent on the number of train passes.

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.

13.5.11 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.

13.5.12 A summary of the likely significant effects identified on a precautionary basis is presented at the end of this section.

13.5.13 Likely significant airborne noise effects arising from permanent changes to existing roads will be reported in the formal ES.

Other mitigation measures

13.5.14 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

13.5.15 Mitigation, including landscape earthworks, described in Volume 1 (Section 9), Section 2.2 and presented in Map Series SV-01 (Volume 2: LA08 Map Book) and Map Series CT-06 (Volume 2: LA08 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.

13.5.16 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.

13.5.17 The initial assessment indicates that, the forecast noise from long-term railway operation will 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 any individual residential properties closest to the Proposed Scheme within the Pinxton to Newton and Huthwaite area.

13.5.18 The initial assessment indicates that there are no significant effects identified at any non-residential receptors in this area as a result of operational noise.

13.5.19 Further assessment work is being undertaken to identify operational noise and vibration significant effects. This will be reported in the formal ES.

13.5.20 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

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

13.5.22 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.

13.5.23 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 Pinxton to Newton and Huthwaite area.

14.1.2 Engagement with Highways England, Nottinghamshire County Council (NCC) and Derbyshire County Council (DCC) 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: LA08 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)[148].

14.2.2 The study area for traffic and transport includes the areas around the settlements of Pinxton, South Normanton, Huthwaite, Hilcote, Blackwell and Newton.

14.2.3 The study area also includes all roads potentially affected by the Proposed Scheme. Strategic roads include: the M1 between junction 27 and junction 29 (including junction 27 and junction 28) and the A38 Trunk Road (west of junction 28 with the M1).

14.2.4 Local roads include the A38 Alfreton Road (east of junction 28 with the M1); the B6018 Mansfield Road/Park Lane; the B6019 Mansfield Road/Pinxton Lane/Alfreton Road/Town Street/Pinxton Green; the B6027 Common Road; the B6406 New Lane/Berristow Lane; the B6026 Cragg Lane/Huthwaite Lane; a small section of Station Road and Beaufit Lane in Pinxton; Farmwell Lane; Brookhill Lane; Pinxton Lane; Nunn Brook Road; Export Drive, Alfreton Road (between Blackwell and Newton) and Newtonwood Lane.

14.2.5 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.

14.2.6 No quantitative assessment has been undertaken at this stage. A quantitative assessment will be presented in the formal ES.

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

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 Highways England, NCC and DCC (including provision of information 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 November 2017. These data have been supplemented by existing traffic data from other sources, including from Highways England, NCC and DCC. Assessment of the data indicates that the peak hours in the area are 07:30-08:30 and 16:30-17:30. However, there are only small differences (2% to 4%) 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 have been used as the assessment hours representing a reasonable worst case.

14.3.3 PRoW surveys were undertaken in August and November 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 The strategic routes that pass through the area are: the M1 and the A38 Trunk Road. The strategic road network in and around the Pinxton to Newton and Huthwaite area is busy at peak times and delays can be experienced.

14.3.5 The local roads that could be affected by the Proposed Scheme include: the A38 Alfreton Road, the B6018 Mansfield Road/Park Lane, the B6019 Pinxton Green/Town Street/Alfreton Road/Pinxton Lane/Mansfield Road at the M1 junction 28, the B6026 Cragg Lane/Huthwaite Lane/Blackwell Road, the B6027 Common Road, the B6406 Berristow Lane/New Lane, a small section of Station Road, Beaufit Lane, Farmwell Lane, Brookhill Lane, Pinxton Lane, Nunn Brook Road, Export Drive, Alfreton Road (between Blackwell and Newton) and Newtonwood Lane. The local road network in this area 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 Department for Transport[149]. Data for the three year period (2014, 2015

[149] Department for Transport (undated) *Crashmap.co.uk.* Available online at: www.crashmap.co.uk CrashMap provides accident data for the UK.

and 2016) have been assessed and any identified clusters (i.e. where there are nine or more accidents in the three year period) have been examined.

14.3.7 Four accident clusters were identified within the Pinxton to Newton and Huthwaite area:

- at the A38 Alfreton Road/B6018 Sutton Road signalised junction (16 accidents, including one serious casualty accident and one fatal casualty accident);
- south of junction 28 of the M1 (28 accidents, including one serious casualty accident);
- at junction 28 of the M1 (32 accidents, including three serious casualty accidents); and
- north of junction 28 of the M1 and to the south of the Tibshelf Motorway Service Area (11 accidents but with no serious casualties or fatalities).

14.3.8 The route of the Proposed Scheme would cross four roads with footways within the Pinxton to Newton and Huthwaite area. These are: the A38 Alfreton Road (along the eastbound carriageway, crossed by the HS2 main line and Sheffield spur), the B6026 Cragg Lane (crossed by the Sheffield spur), the B6026 Huthwaite Lane (west of the M1, crossed by the Sheffield spur) and Alfreton Road in Newton (crossed by the Sheffield spur). In addition, the Proposed Scheme would cross five roads without formal footways; these are: the B6406 New Lane (crossed by the Sheffield spur), the B6026 Huthwaite Lane (east of the M1 and crossed by the HS2 main line), Pinxton Lane/Brookhill Lane (crossed by the HS2 main line), Farmwell Lane and Newtonwood Lane.

Parking and loading

14.3.9 There is no parking or loading identified in the Pinxton to Newton and Huthwaite 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 Eight bus routes operate on five roads that are crossed by the route of the Proposed Scheme in the Pinxton to Newton and Huthwaite area. There are also bus stops primarily located to serve the main built up area. The bus routes that could be affected by the Proposed Scheme include:

- Pinxton/Brookhill Lane: the ninety service (Sutton - Kirkby - Selston - Ripley);
- A38 Alfreton Road: service 9.1 (Derby - Ripley - Alfreton - Sutton - Mansfield) and service 149 (Alfreton - Mickley - Hilcote - Sutton in Ashfield);
- B6406 New Lane: service 140 (Hilcote - Tibshelf - Blackwell Schools) and service 149 (Alfreton - Mickley - Hilcote - Sutton in Ashfield);
- B6026 Huthwaite Lane: service 140 (Hilcote - Tibshelf - Blackwell Schools); and
- Alfreton Road (Newton): service 1 (Mansfield Woodhouse - Huthwaite - Alfreton), service 56 (Chesterfield - Tibshelf - Alfreton or Chesterfield -

Alfreton), service X56 (Chesterfield - Tibshelf - Heanor or Chesterfield - Alfreton), service 140 (Hilcote - Tibshelf - Blackwell Schools), service 149 (Alfreton - Mickley - Hilcote - Sutton in Ashfield) and service 422 (Westhouses - Tibshelf School and Town End School).

14.3.11 National and local rail services are accessible via Alfreton station and local rail services are accessible via Sutton Parkway station and Kirkby-in-Ashfield station. Alfreton station provides access to national services to Chesterfield, Sheffield, Manchester, Liverpool, Nottingham, Peterborough and Norwich. Sutton Parkway and Kirkby-in-Ashfield stations provide access to local services to Nottingham and Mansfield.

Non-motorised users

14.3.12 There are pedestrian footways adjacent to many of the roads in the built up areas of Pinxton, South Normanton, Huthwaite, Hilcote, Blackwell and Newton. 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 17 PRoW within the Pinxton to Newton and Huthwaite 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. Surveys undertaken to inform the assessment show that that there were fewer than 10 people a day recorded during the survey day on seven PRoW. The three PRoW with the greatest observed usage recorded during the survey day were the Silverhill Trail, a short section of which forms part of the National Cycle Network (NCN) Route 67 (used by 299 people, including 232 cyclists), the Blackwell Trail (used by 124 people, including 35 cyclists) and the Blackwell Footpath B3-8/1 (used by 20 people).

Waterways and canals

14.3.14 There are no navigable waterways in the Pinxton to Newton and Huthwaite area. Consequently, this topic is not considered further in this assessment.

Air transport

14.3.15 There is no relevant air transport in the Pinxton to Newton and Huthwaite 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

diversion 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)[150] 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

[150] Supporting document: Draft Code of Construction Practice

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 to 18:00 on weekdays and 08:00 to 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[151] to be produced that would include a range of potential measures to mitigate the impacts of traffic and transport movements associated with construction of the Proposed Scheme.

Assessment of impacts and effects

Temporary effects

14.4.7 The traffic and transport impacts during the construction period within the Pinxton to Newton and Huthwaite area are likely to include:

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

14.4.8 The construction assessment has also considered any impacts in the Pinxton to Newton and Huthwaite area that arise from construction of the Proposed Scheme in the adjoining community areas.

14.4.9 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.

14.4.10 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: LA08 Map Book. Highway network.

Strategic and local highway network

14.4.11 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, where reasonably practicable. The construction routes would also provide access to compounds. Where reasonably practicable, HGVs would use the site haul routes

[151] 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.

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 M1 junction 28;
- the A38 Trunk Road west of the M1 junction 28;
- the A38 Alfreton Road east of the M1 to its junction with Pinxton Lane;
- the B6019 Pinxton Green/Town Street/Alfreton Road/Pinxton Lane/Mansfield Road to junction 28 of the M1;
- the B6027 Common Road, between the A38 Alfreton Road to the south and Nunn Brook Road to the north;
- the B6406 Berristow Lane, approximately up to the junction with High View Road;
- the B6026 Huthwaite Lane/Blackwell Road, between the junction with Nunn Brook Road to the east and the B6026 Cragg Lane to the west;
- the B6026 Cragg Lane in the proximity of Blackwell;
- Station Road, south east of the Brookhill Industrial Estate in Pinxton;
- Beaufit Lane, east of the Brookhill Industrial Estate in Pinxton;
- Brookhill Lane to Pinxton Lane;
- Pinxton Lane to the junction with the A38 Alfreton Road;
- Farmwell Lane to the junction with Pinxton Lane;
- Export Drive, on the western side of the B6027 Common Road; and
- Nunn Brook Road, between the B6026 Huthwaite Lane to the north and the B6027 Common Road to the south.

14.4.12 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:

- implementation of traffic management measures on the M1, in order to allow construction works under the existing carriageway as part of the M1 crossing at Blackwell (between junction 28 and junction 29); and
- Alfreton Road in Newton to allow construction works under the existing road.

14.4.13 Permanent changes to highways are reported under operation.

14.4.14 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.

14.4.15 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

14.4.16 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

14.4.17 It is expected that construction of the Proposed Scheme would require bus route diversions, including bus routes: 1, 56, X56, 140, 149, 422 and the ninety service. This could result in increased journey times and the need to relocate bus stops. Any consequent effects will be reported in the formal ES.

Non-motorised users

14.4.18 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.

14.4.19 It is currently expected that the following PRoW would be temporarily diverted/realigned or closed:

- Sutton-in-Ashfield Footpath 59 – diverted west onto the existing Sutton in Ashfield Bridleway 60;
- Pinxton Footpath B8-1/1 –diverted west of its current alignment and south of Farmwell Lane;
- Blackwell Trail realigned locally around the current alignment and under the route of the Sheffield Spur and the HS2 main line;
- Sutton-in-Ashfield Bridleway 30 – diverted to the east of its current alignment, just north of the B6026 Huthwaite Lane/Backwell Road;
- Blackwell Footpath B3-36/2 – diverted to the north of its current alignment and onto the diverted Sutton-in-Ashfield Bridleway 30;
- Blackwell Footpath B3-10/5 – closed. An alternative route would be available via a network of existing, new and realigned PRoW, including the realigned Silverhill Trail, a short section of which forms part of the NCN Route 67;
- Silverhill Trail (a short section of which forms part of the NCN Route 67) – realigned to the south of its existing alignment at the location of the proposed Silverhill Trail overbridge, which would pass over the HS2 main line;
- Blackwell Footpath B3-11/2 – diverted to the west of its current alignment, onto a new footpath connection with the realigned Silverhill Trail (a short section of which forms part of the NCN Route 67) and southeast of the Tibshelf Motorway Service Area, east of the M1; and

- Blackwell Footpath B3-12/2 – diverted east of its current alignment and joining the realigned Silverhill Trail (a short section of which forms part of the NCN Route 67.

14.4.20 Permanently diverted PRoW are reported under operation although these PRoW could also be subject to temporary closure or diversion/realignment.

14.4.21 The realignment of some of the PRoW would increase journey distance and time for non-motorised users and may result in significant effects. It is expected that the greatest increase in journey distance (likely to be in excess of an additional 500m) would affect the users of Blackwell Footpath B3-10/5. The assessment of these changes will be reported in the formal ES.

Permanent effects

14.4.22 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

14.4.23 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.

14.4.24 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

14.4.25 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 M1 junction 28, the A38 Trunk Road and the A38 Alfreton Road, the B6019 Pinxton Green/Town Street/Alfreton Road/Pinxton Lane/Mansfield Road, the B6027 Common Road, the B6406 Berristow Lane, the B6026 Huthwaite Lane, the B6026 Cragg Lane, Beaufit Lane, Station Road, Brookhill Lane, Pinxton Lane, Farmwell Lane, Export Drive and Nunn Brook 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 a change in accident risk.

14.4.26 Construction of the Proposed Scheme is expected to result in temporary highway closures and diversions or realignments. These are expected to include: the M1, with temporary traffic management measures between junction 28 and junction 29 and Alfreton Road (in Newton).

14.4.27 Bus services the ninety service and services: 1, 56, X56, 140, 149 and 422 would be affected by temporary diversions.

14.4.28 A number of PRoW could also be subject to temporary closure or diversion/realignment. These PRoW include: Sutton-in-Ashfield Footpath 59, Pinxton Footpath B8-1/1, the Blackwell Trail, Sutton-in-Ashfield Bridleway 30, Blackwell

Footpath B3-36/2, Blackwell Footpath B3-10/5, the Silverhill Trail (a short section of which forms part of the NCN Route 67), Blackwell Footpath B3-11/2 and Blackwell Footpath B3-12/2.

14.4.29 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 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 Pinxton and Newton and Huthwaite area. The maintenance of the Proposed Scheme would generate limited vehicular trips and the effect would not be significant.

14.5.4 The operational impacts are therefore primarily related to permanent diversion, realignment and stopping up of roads and the diversion or stopping up of PRoW.

Highway network

Strategic and local highway network

14.5.5 The Proposed Scheme would result in a number of permanent highway changes. These include:

- realigned B6406 New Lane across the Sheffield spur, to the east of its existing alignment, between the north of Hilcote and the B6026 Huthwaite Lane;
- realigned B6026 Huthwaite Lane, to the north-west of its existing alignment and east of the M1, between Spring Farm to the west and the realignment of the B6406 New Lane to the east. This realignment would be required as part of the proposed crossing of the HS2 main line;
- the B6026 Cragg Lane overbridge across the Sheffield spur and realigned B6026 Cragg Lane to the north-west of Blackwell and west of the M1;
- realigned B6026 Huthwaite Lane to the west of the M1 and north of Blackwell

as part of the crossing of the Sheffield spur;

- realigned Brookhill Lane under the HS2 main line at the Maghole Brook viaduct, south of its existing alignment, between Crow Trees Farm to the east and Brookhill Hall farm to the west;
- online vertical realignment of Farmwell Lane across the HS2 main line, immediately to the north-east of Castlewood Business Park and East Midlands Designer Outlet; and
- new Newtonwood Lane overbridge across the HS2 main line, approximately 150m east of the M1 Tibshelf motorway service area.

14.5.6 The permanent highway changes are not expected to result in significant changes in travel distances. The effects of these changes, including on non-motorised users, will be reported in the formal ES.

Accidents and safety

14.5.7 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

14.5.8 The permanent realignment of roads could increase travel distances for bus passengers. However, as most of the realignments are likely to be less than 1km in length, it is not currently expected that there would be significant effects on public transport within the Pinxton and Newton and Huthwaite area.

Non-motorised users

14.5.9 A number of PRoW that cross the route of the Proposed Scheme would be either permanently realigned or diverted including:

- Sutton-in-Ashfield Bridleway 60 – diverted to the east of its current alignment, along the south side of the realigned Brookhill Lane, to where it meets Sutton-in-Ashfield Footpath 59 existing alignment;
- Sutton-in-Ashfield Footpath 59 – diverted onto the realigned Sutton in Ashfield Bridleway 60 to the realigned Brookhill Lane;
- Pinxton Footpath B8-1/1 – realigned to the east of its current alignment and south of Farmwell Lane;
- Sutton-in-Ashfield Footpath 41 – diverted east of its current alignment along the western boundary of the Fulwood Industrial Estate;
- Blackwell Footpath B3-6/1 – diverted south from its current alignment (to the west of the Sheffield spur) and onto the Blackwell Trail which crosses both the Sheffield spur and the HS2 main line. East of the HS2 main diverted south along the western side of the County Estate;
- Blackwell Footpath B3-8/1 – closed. An alternative route would be available along the realigned B6406 New Lane, north of Hilcote and across the Sheffield

spur;

- Sutton-in-Ashfield Bridleway 30 – diverted to the west of its current alignment, just north of the B6026 Huthwaite Lane and west along the B6026 Huthwaite Lane realignment, near Spring Farm;
- Blackwell Footpath B3-36/2 – diverted to the south of its current alignment and onto the B6026 Huthwaite Lane realignment, to the west of Spring Farm;
- Blackwell Footpath B3-10/5 – closed. An alternative route would be available via a network of existing, new and realigned PRoW, including the Silverhill Trail, a short section of which forms part of the NCN Route 67;
- Blackwell Footpath B3-10/6 – realigned to the east of its current alignment;
- Blackwell Footpath B3-11/1 – realigned to the west of its current alignment, immediately to the south of the Silverhill Trail (a short section of which forms part of the NCN Route 67) and southeast of the Tibshelf Motorway Service Area, east of the M1;
- Blackwell Footpath B3-11/2 – realigned to west of its current alignment, immediately to the south of the Silverhill Trail (a short section of which forms part of the NCN Route 67) and southeast of the Tibshelf Motorway Service Area, east of the M1;
- Silverhill Trail (a short section of which forms part of the NCN Route 67) – realigned vertically in order to pass over the Proposed Scheme via the Silverhill Trail overbridge;
- Blackwell Footpath B3-12/2 – diverted east of its current alignment and joining the Silverhill Trail approximately 150m to the east of where Blackwell Footpath B3-11/2 goes under the Silverhill Trail (a short section of which forms part of the NCN Route 67);
- Blackwell Footpath B3-13/1 – closed, but with alternative routes becoming available via the Silverhill Trail (a short section of which forms part of the NCN Route 67) and a new proposed footpath connection, to the south of the Tibshelf Motorway service area, east of the M1; and
- Tibshelf Footpath B13-46/1 – diverted west of its current alignment in order to join the realigned Newtonwood Lane near the eastern boundary of the Tibshelf Motorway service area, east of the M1.

14.5.10 The realignment of some of the PRoW would increase journey distance and time for non-motorised users and may result in significant effects. It is expected that the greatest increase in journey distance (likely to be in excess of an additional 500m) would affect the users of Blackwell Footpath B3-8/1, Blackwell Footpath B3-10/5 and Blackwell Footpath B3-12/2. The assessment of these changes will be reported in the formal ES.

Other mitigation measures

14.5.11 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.

14.5.12 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

14.5.13 Operation of the Proposed Scheme would require the permanent diversion or realignment of the B6406 New Lane, the B6026 Huthwaite Lane (east of the M1), the B6026 Huthwaite Lane/Cragg Lane west of the M1, Brookhill Lane, Farmwell Lane and Newtonwood Lane although these are unlikely to result in permanent significant effects. Increases in traffic could also result in traffic severance for non-motorised users of the route and changes in traffic could result in changes in accident risk.

14.5.14 It is expected that 16 PRoW, would either be permanently realigned or diverted including: Sutton-in-Ashfield Bridleway 60 and Footpath 59, Pinxton Footpath B8-1/1, Sutton-in-Ashfield Footpath 41, Blackwell Footpaths B3-6/1 and B3-8/1, Sutton-in-Ashfield Bridleway 30, Blackwell Footpaths B3-36/2, B3-10/5, B3-10/6, B3-11/1, B3-11/2, B3-12/2 and B3-13/1, the Silverhill Trail (a short section of which forms part of the NCN Route 67) and Tibshelf Footpath B13-46/1.

14.5.15 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

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

14.5.17 There are no other area-specific monitoring requirements currently proposed for traffic and transport in the Pinxton to Newton and Huthwaite 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 Pinxton to Newton and Huthwaite 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, Nottinghamshire County Council (NCC) and Derbyshire County Council (DCC), which are the lead local flood authorities (LLFA), Ashfield District Council (ADC), Bolsover District Council (BDC) and Severn Trent Water Limited (the local water and sewerage undertaker). 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: LA08 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)[152].

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)[153].

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

[152] Department for Communities and Local Government (DCLG) (2015) *National Planning Policy Framework*. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf
[153] 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 modelling of Normanton Brook.

15.2.6 Groundwater levels are being 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 is 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 Trent Lower and Erewash and Derwent Derbyshire management catchments of the Humber river basin district (RBD).

15.3.2 The river basin management plan[154] identifies the chemical[155] and ecological[156] status of surface water bodies, and the quantitative[157] and chemical[158] status of groundwater bodies within this RBD.

[154] Environment Agency (2015) *Water for life and livelihoods Part 1: Humber river basin district: River basin management plan.* Available online at:https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/500465/Humber_RBD_Part_1_river_basin_management_plan.pdf

[155] The chemical status of surface waters reflects concentrations of priority and hazardous substances present.

[156] 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 the ecology and biodiversity section;
- 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.

[157] 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.

[158] 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 32. The receptor value attributed to each individual water body is based on the methodologies set out in the SMR.

Table 32: Surface water body receptors

Water body name and location[159])	**Designation**	**Q95 value (m3/s)[160]**	**Receptor value**	**Parent WFD water body name and identification number[161]**	**Current WFD status/Objective[162]**
Maghole Brook WR-01-359b H5	Ordinary watercourse	0.004	Moderate	Erewash from Source to Nethergreen Brook (GB104028052740)	Poor/Moderate by 2015
Tributary 1 of Maghole Brook WR-01-359b H6	Ordinary watercourse	≤0.002	Moderate		
Tributary 2 of Maghole Brook WR-01-359b I6	Ordinary watercourse	≤0.002	Moderate		
Tributary 3 of Maghole Brook WR-01-359b I6	Ordinary watercourse	≤0.002	Moderate		
Normanton Brook WR-01-360a B6	Main river	0.01	High	Alfreton Brook from Source to Westwood Brook (GB104028052350)	Moderate/Moderate by 2027
Tributary 1 of Normanton Brook WR-01-360a C5	Ordinary watercourse	≤0.002	Moderate		

[159] The feature locations are indicated by the grid coordinates on the relevant Volume 2: LA08 Map Book figure (in this case WR-01).
[160] This the flow within the watercourse that is exceeded for 95% of the time.
[161] The Environment Agency has attributed each surface water and groundwater body a unique water body identification (ID) number.
[162] Status and objectives are based on those set out in the 2015 River basin management plan.

Water body name and location[159])	Designation	Q95 value (m3/s)[160]	Receptor value	Parent WFD water body name and identification number[161]	Current WFD status/Objective[162]
Tributary 2 of Normanton Brook WR-01-360a C5	Ordinary watercourse	≤0.002	Moderate		
Tributary 3 of Normanton Brook WR- 01-360a D5	Ordinary watercourse	≤0.002	Moderate		
Tributary of Morton Brook WR-01-360a C2	Ordinary watercourse	≤0.002	Moderate	Westwood Brook Catchment, tributary of Alfreton Brook (GB104028052360)	Moderate/Moderate by 2015

Abstractions and permitted discharges (surface water)

15.3.6 There is one licensed surface water abstraction in the study area, which is not located within the land required for the construction and operation of the Proposed Scheme. The licence is for a private water supply for aquaculture (fisheries) use, with a maximum daily abstraction of approximately 450 m^3 and is considered a high value receptor.

15.3.7 Records of private unlicensed surface water abstractions, which comprise those for quantities less than 20m^3 per day, have been obtained. 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 groundwater 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 19[163] consented discharges in total to surface waters within the study area, none of which are located within the land required for 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 33. Unless stated otherwise, the geological groups listed would all be crossed by the Proposed Scheme. Table 33 also identifies the receptor values attributed to each groundwater receptor based on the methodologies set out in the SMR.

[163] The number of consents quoted is different to the number quoted in Section 10, Land Quality because the Water resources and flood risk study area considers surface water and groundwater features within 1km of the centreline of the Proposed Scheme and do not count revoked consents. The land quality study area considers an area extending 250m from the land required for the construction of the Proposed Scheme.

Table 33: Summary of geology and hydrogeology in the study area

Geology[164]	Distribution	Formation description	Aquifer classification	WFD body (ID) and current overall status [165]	WFD status objective[166]	Receptor value
Superficial deposits						
Alluvium	Along the River Erewash and its tributaries to the south of Pinxton and along Normanton Brook and Nunn Brook across the study area	Clay, silt, sand, peat and gravel	Secondary A	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Moderate
Bedrock						
Zechstein Group - Cadeby Formation	Localised outcrops to the west of Sutton-in-Ashfield and north and east of Newtonwood Lodge Farm	Dolostone, with mudstone, dolomitic siltstone and sandstone	Principal	Don & Rother Millstone grit & Coal Measures (GB40402G992300) Poor	Good by 2027	High
Pennine Coal Measures Group - Pennine Middle Coal Measures Formation	Underlying the majority of the study area	Mudstone, siltstone, sandstone and commonly with coal seam	Secondary A	Lower Trent Erewash – Coal Measures (GB40402G303200) Good	Good by 2015	Moderate

Superficial deposit aquifers

15.3.10 The basis of the receptor value attributed to the superficial deposit aquifer present within the study area, as shown in Table 33, is outlined briefly as alluvium that may be capable of supporting water supplies locally rather than on a regional scale, and which may also form an important source of baseflow to rivers. It has 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 33 is outlined briefly as follows:

- the Zechstein Group is present within the study area as the Cadeby Formation. The Cadeby Formation has been classified as a Principal aquifer by the Environment Agency. This aquifer can also provide an important component of baseflow to rivers. It has therefore been assessed as a high value receptor;

[164] In recent years the British Geological Survey 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.
[165] As stated in the 2015 River basin management plan
[166] As stated in the 2015 River basin management plan.

and

- the Pennine Coal Measures Group is generally described as an alternation of sandstone, siltstone and mudstone, with frequent coal seams and seat earth horizons. The Pennine Coal Measures Group has been classified as a Secondary A aquifer by the Environment Agency. Limited quantities of groundwater suitable for domestic or agricultural use are occasionally obtainable within the sandstone beds of this rock formation and it has therefore been classified as a moderate value receptor.

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 33. 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 and no source protection zones (SPZ) 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, as shown on Map WR-02-316.

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. 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 one consented discharge to groundwater within the study area. The discharge is not located within the land required for the Proposed Scheme but lies adjacent to it. This discharge has been assessed as a low value receptor.

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 11 features within the study area that had potential to be springs. Access was not possible to inspect any of these features at this stage.

15.3.19 The 11 potential spring features that have yet to be inspected are assumed to be high value receptors on a precautionary basis.

15.3.20 There are 13 ponds within the land required for 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 No groundwater dependent designated nature conservation sites have been identified within the study area that have the potential to be affected by the Proposed Scheme.

15.3.22 There is one nature conservation site which is potentially dependent on surface water flows. Maghole Brook and Ashfield District Dumple LWS is partially within the land required for the Proposed Scheme, east of Brookhill Hall. The site includes a stream and dumble.

Existing baseline - flood risk and land drainage

15.3.23 The Environment Agency's Flood map for planning (rivers and sea)[167] 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[168] 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[169]. The BGS Groundwater flooding susceptibility dataset[170] 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:

- Nottinghamshire Local Flood Risk Management Strategy (LFRMS) (2015);
- Nottinghamshire County Council Preliminary Flood Risk Assessment (PFRA) (2011);
- Derbyshire LFRMS (2015);
- Derbyshire PFRA (2011);
- Ashfield District Council Strategic Flood Risk Assessment (SFRA) (2009); and
- Chesterfield, Bolsover and North East Derbyshire District Council SFRA (2009).

[167] Environment Agency (undated) *Flood map for planning.* Available online at: https://flood-map-for-planning.service.gov.uk/
[168] Environment Agency (2018), *Long term flood risk map for England*. Available online at: https://flood-warning-information.service.gov.uk/long-term-flood-risk/
[169] Environment Agency (2018), *Long term flood risk map for England*. Available online at: https://flood-warning-information.service.gov.uk/long-term-flood-risk/
[170] British Geological Survey (2017) *BGS Groundwater flooding.* Available online at: http://www.bgs.ac.uk/products/hydrogeology/groundwaterFlooding.html

River flooding

15.3.26 The study area includes areas of floodplain (Flood Zone 2 and 3) associated with Maghole Brook, an unnamed tributary of the River Erewash at Pinxton and Normanton Brook. Table 34 shows all the 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 34: River flood risk sources and receptors

Source	Location description and figure/coordinate [171]	Receptor potentially affected	Receptor value/sensitivity to flooding
Erewash and Maghole Brook at confluence at Pinxton	Brookhill Industrial Estate WR-01-359b G4	Brookhill Industrial Estate, industrial properties and local roads	Moderate
Maghole Brook at Pinxton	Pinxton WR-01-359b G5	M1	Very high
Maghole Brook upstream of crossing	Land north of Pinxton WR-01-359b H6	Agricultural land at Brookhill Farm, Cliff Lane	Moderate
Tributary 3 of Maghole Brook (d/s, north)	South Normanton WR-01-359b I6	Mansfield Road and Farmwell Lane	Moderate
Tributary 4 of Maghole Brook (d/s, north)	Land north of Pinxton WR-01-359b I6	Land to the rear of B6019 Mansfield Road	Moderate
Tributary 5 of Maghole Brook (u/s, north)	Pinxton WR-01-359b I6	Agricultural land running alongside slip road accessing B6019 Mansfield Road	Moderate
		A38 Alfreton Road at Junction with B6406 Berristow Lane	High
Tributary of Normanton Brook (u/s, south)	Huthwaite WR-01-360a B6	Agricultural land west of Fulwood at Common Road	Moderate
Normanton Brook d/s of crossing 1 (further east) and upstream of crossing 2 (central) and 3 (further west)	South Normanton WR-01-260a B6	Former Blackwell Tip at B6406 Berristow Lane	Moderate
		Industrial Estate at Brookside Way	Moderate

Surface water flooding

15.3.27 There are numerous 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 35. The value of these receptors, based on Table 57 of the SMR, is also indicated.

[171] This is the location at which the source intersects the Proposed Scheme, as indicated by the grid coordinates on the relevant Volume 2: CA1 Map Book figure (in this case WR-01).

Table 35: Surface water flood risk sources and receptors

Source	Location description and figure/coordinate[172]	Receptor potentially affected	Receptor value
Surface water flow path at Brookhill Lane in Kirkby in Ashfield (Nottingham)	Brookhill Lane WR-01-359b H5	Brookhill Lane in Kirkby in Ashfield (Nottingham)	Moderate
Surface water flow path at East Midlands Designer Outlet at B6019 Mansfield Road in South Normanton	Land south of A38 Alfreton Road in Pinxton WR-01-359b I6	Car Park	Moderate
		Agricultural land to the north of Pinxton	Moderate
Surface water flow path at Newton Wood Farm	Newton Wood Farm WR-01-360a D4	Newton Wood Farm at Newtonwood Lane in Alfreton	High
		Agricultural land to the south of Newtonwood Lane in Alfreton	Moderate
Surface water flow path at B6026 Huthwaite Lane	B6026 Huthwaite Lane WR-01-360a C4	Pipes Farm	High
		B6026 Huthwaite Lane	Moderate
		Agricultural land	Moderate
Surface water flow path at Newton	Newton WR-01-360a C3	Alfreton Road in Newton	Moderate
		Priory Way in Newton	Moderate
		Thurgaton Way in Newton	Moderate
		Residential properties at Alfreton Road in Newton	High
		Residential properties at Priory Way in Newton	High
		Residential properties at Thurgaton Way in Newton	High

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. No artificial water bodies have been identified to have potential implications for the flood risk within the study area.

Groundwater flooding

15.3.29 Information related to historical incidents of groundwater flooding in the Pinxton to Newton and Huthwaite area is provided within the NCC LFRMS, PFRA and the ADC SFRA. The LFRMS, PFRA and SFRA state that the risk of groundwater flooding is considered to be relatively low within north-west Nottinghamshire where the Pennine

[172] This is the location at which the source intersects the Proposed Scheme, as indicated by the grid coordinates on the relevant Volume 2: CA1 Map Book figure (in this case WR-01).

Coal Measures Formation occurs, but that groundwater can contribute to flooding from other sources.

15.3.30 Additional information related to historical incidents of groundwater flooding in the Pinxton to Newton and Huthwaite area is provided within the DCC LFRMS, PFRA and the Chesterfield, Bolsover and North East Derbyshire District Council SFRA. The LFRMA, PFRA and SFRA state that the risk of groundwater flooding is considered to be low to medium within north-east Derbyshire, without making specific mention of the study area. Risk is considered low due to the lack of low lying land and prevalence of Coal Measures bedrock geology.

15.3.31 The BGS Groundwater flooding susceptibility dataset indicates that there is some potential for groundwater flooding to occur along the floodplain of Normanton Brook.

Land drainage

15.3.32 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)[173] 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 would avoid passing along river or stream valleys, such as that of Maghole Brook and Normanton Brook and their associated floodplains. Instead it would pass over these watercourses on viaducts spanning the floodplain, with piers set back from the channel;

[173] Supporting document: Draft Code of Construction Practice

- 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.

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: LA08 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 A watercourse realignment is proposed at minor unnamed tributary 2 of the Normanton Brook under Huthwaite road realignment east of Huthwaite. The aim will be to design these with equivalent hydraulic capacity to the existing channels. The Proposed Scheme would also 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 principle will be to incorporate appropriate features to retain and, where reasonably practicable, enhance their hydromorphological condition[174].

15.4.6 Watercourse diversions, which would result in changes in flow regime within discrete sections of channel, have been avoided wherever possible. There are no diversions proposed within this study area.

15.4.7 For watercourses that are not in their natural condition, the design aim for realignments 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:

- 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

[174] "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.

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 Brookhill Lane realignment drop inlet culvert on minor unnamed tributary 1 of Maghole Brook, two culverts on minor unnamed tributary 2 of Maghole Brook respectively Brookhill Lane embankment culvert and drop inlet culvert under Farmwell Lane realignment, Hilcote East embankment drop inlet culverts 1 and 2 on unnamed tributaries 1 and 2 of Normanton Brook, Hilcote East embankment culverts 3 and 4 on unnamed tributaries 3 and 4 of Normanton Brook and two culverts on the unnamed tributary 2 of Normanton Brook under the Huthwaite Lane realignment. The detailed design of these culverts will be developed in general accordance with Construction Industry Research and Information Association (CIRIA), 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 wherever reasonably practicable. Exceptions to this are three drop inlet culverts proposed for locations where roads intersect the route of the HS2 main line on minor unnamed tributary 1 of Maghole Brook under Brookhill Lane, tributary 1 of Normanton Brook and tributary 2 of Normanton Brook;
- 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 would 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 would 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[175] 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 would be refined and method of mitigation will be designed following ground investigation at foundations and 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 would ensure that the impacts on flood flows within rivers and streams, and their floodplains, would be limited to those associated with the intermediate pier structures on the viaducts of Maghole Brook and Normanton Brook floodplains. The Proposed Scheme includes replacement floodplain storage areas to replace for floodplain losses associated with the piers;
- the temporary works shown on Map Series CT-05 in the Volume 2: LA08 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 would cross surface water flow paths where reasonably practicable. This would be achieved using perimeter

[175] Impermeable barrier preventing water flow

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 would 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 climate change based on latest guidance issued by the Environment Agency[176];
- 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 would 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 would pass in cutting, drainage measures would be provided with the aim of preventing flow into the cutting. This flow would be diverted into its natural catchment. Where reasonably practicable, runoff from the cuttings would 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 otherwise increase flood risk or impact on land drainage systems; and
- measures would 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 would 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

[176] Environment Agency (2016) *Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities.* Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/571572/LIT_5707.pdf

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 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 Section 16 of the draft CoCP, monitoring would 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 would 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 would intersect the Pennine Coal Measures Group Secondary A aquifers. 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 Where cuttings could affect local receptors, such as groundwater abstractions or springs, this is reported in the sections below.

Abstractions

15.4.23 There are no groundwater abstractions within the study area with the potential to be impacted by the Proposed Scheme.

Groundwater - surface water interactions

15.4.24 The Proposed Scheme is likely to result in temporary effects on two potential spring features – one south of Sutton-in-Ashfield Industrial Estate and one at Old Blackwell, as they are within the land required for the construction and operation of the Proposed Scheme.

15.4.25 The spring at Sutton-in-Ashfield is underlain by the Pennine Middle Coal Measures Formation on a Secondary A Aquifer and has been assessed as being a high value receptor. The likely potential impact on this spring has been considered to be moderate, resulting in a temporary moderate adverse effect, which is significant.

15.4.26 The spring at Blackwell is underlain by the Pennine Middle Coal Measures Formation on a Secondary A Aquifer and has been assessed as being a high value receptor. The likely potential impact on this spring has been considered to be moderate, resulting in a temporary moderate adverse effect, which is significant.

Water dependent habitats

15.4.27 There Proposed Scheme is not anticipated to temporarily impact surface water flow or quality at Maghole Brook and District Dumble LWS therefore there is no anticipated hydrological impact on this site.

Temporary effects - Flood risk and land drainage

15.4.28 Construction of the Maghole Brook viaduct, Normanton Brook east viaduct, Normanton Brook central viaduct and Normanton Brook west viaduct would require temporary working within flood zones. This would include a proposed construction traffic route which would require crossings of Maghole Brook and Normanton Brook on temporary bridges. Furthermore, there is likely to be temporary construction works required to construct culverts on unnamed tributary 1 of Maghole Brook (Brookhill Lane), unnamed tributary 2 of Maghole Brook, unnamed tributaries 1 and 2 of Normanton Brook (B6026 Huthwaite Lane) and unnamed tributaries 3 and 4 of Normanton Brook (Hilcote). Construction sequencing and temporary works design will be carefully considered and assessed in terms of potential impacts on flood risk. Method statements detailing how these works will 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

15.4.29 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

15.4.30 Drop inlet culverts are proposed on three watercourses which have been assessed as moderate value receptors. These drop inlet culverts would have the potential to cause moderate impacts on the hydromorphology of the watercourses, which are: minor unnamed tributary 1 of Maghole Brook under Brookhill Lane realignment, minor unnamed tributary 1 of Normanton Brook and minor unnamed tributary 2 of Normanton Brook both under Hilcote East embankment. These would potentially result in moderate adverse effects, which would be significant.

15.4.31 Culverts are proposed on several watercourses which have all been assessed as moderate value receptors. These culverts would have the potential to cause moderate impacts on the hydromorphology of the watercourses, which are: unnamed tributary 2 of Maghole Brook, unnamed tributary 2 of Normanton Brook, unnamed tributary 3 of Normanton Brook and unnamed tributary 4 of Normanton Brook. These would potentially result in moderate adverse effects, which would be significant.

Groundwater

Aquifers

15.4.32 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 intercepted by the Proposed Scheme. 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

15.4.33 The assessment has not identified any permanent significant effects on groundwater abstractions.

Groundwater - surface water interactions

15.4.34 The assessment has not identified any permanent significant effects on spring features within the study area.

Permanent effects - Flood risk and land drainage

15.4.35 The Proposed Scheme includes replacement floodplain storage areas to compensate for floodplain losses associated with the piers of Maghole Brook and Normanton Brook viaducts. For this reason, impacts on receptors are likely to be negligible, resulting in no significant effects.

Water dependent habitats

15.4.36 The location of the piers of Maghole Brook viaduct are within the floodplain and could have a minor impact on the hydromorphology of Maghole Brook and District Dumble LWS. Details of the significance of this impact on this site is provided in Section 7, Ecology and biodiversity.

Other mitigation measures

15.4.37 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.

Surface water

15.4.38 The embedded mitigation proposed in the design of the culverts and drop-inlet culverts on Maghole Brook minor tributaries and Normanton Brook minor tributaries will be developed further in consultation with the Environment Agency and LLFAs. Monitoring, and remediation if necessary, will be undertaken to ensure successful establishment of the mitigation proposals developed.

Groundwater – Surface water interactions

15.4.39 A survey of the two potential spring features – one close to the business park south of Sutton-in-Ashfield and one at Old Blackwell – will be undertaken to determine their value and to identify whether further mitigation is required. If they are confirmed to be springs, measures will be implemented to re-establish them nearby in a manner that mitigates adverse impacts.

15.4.40 Any such additional measures will be designed in consultation with the Environment Agency.

Summary of likely residual significant effects

15.4.41 In the absence of the other mitigation measures set out above, the Proposed Scheme would potentially result in residual significant effects as follows:

- permanent moderate adverse effects related to the construction of drop inlet culverts on unnamed tributary 1 of Maghole Brook, unnamed tributary 1 of Normanton Brook and unnamed tributary 2 of Normanton Brook, which are significant;
- permanent moderate adverse effects related to the construction of culverts on the hydromorphology of unnamed tributary 2 of Maghole Brook, unnamed tributary 1 of Normanton Brook, unnamed tributary 2 of Normanton Brook, unnamed tributary 3 of Normanton Brook, and unnamed tributary 4 of Normanton Brook, which are significant; and
- temporary moderate adverse impacts on two spring features near Sutton in Ashfield and Old Blackwell, resulting in moderate adverse effects, which are significant.

15.4.42 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, 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 would 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.

16 References

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