

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

Working Draft Environmental Statement

Volume 2: Community Area report

LA12: Ulley to Bramley

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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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A report prepared for High Speed Two (HS2) Limited:

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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: MMLo1 Danesmoor to Brierley Bridge and MMLo2 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 MMLo1 Danesmoor to Brierley Bridge and MMLo2 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.

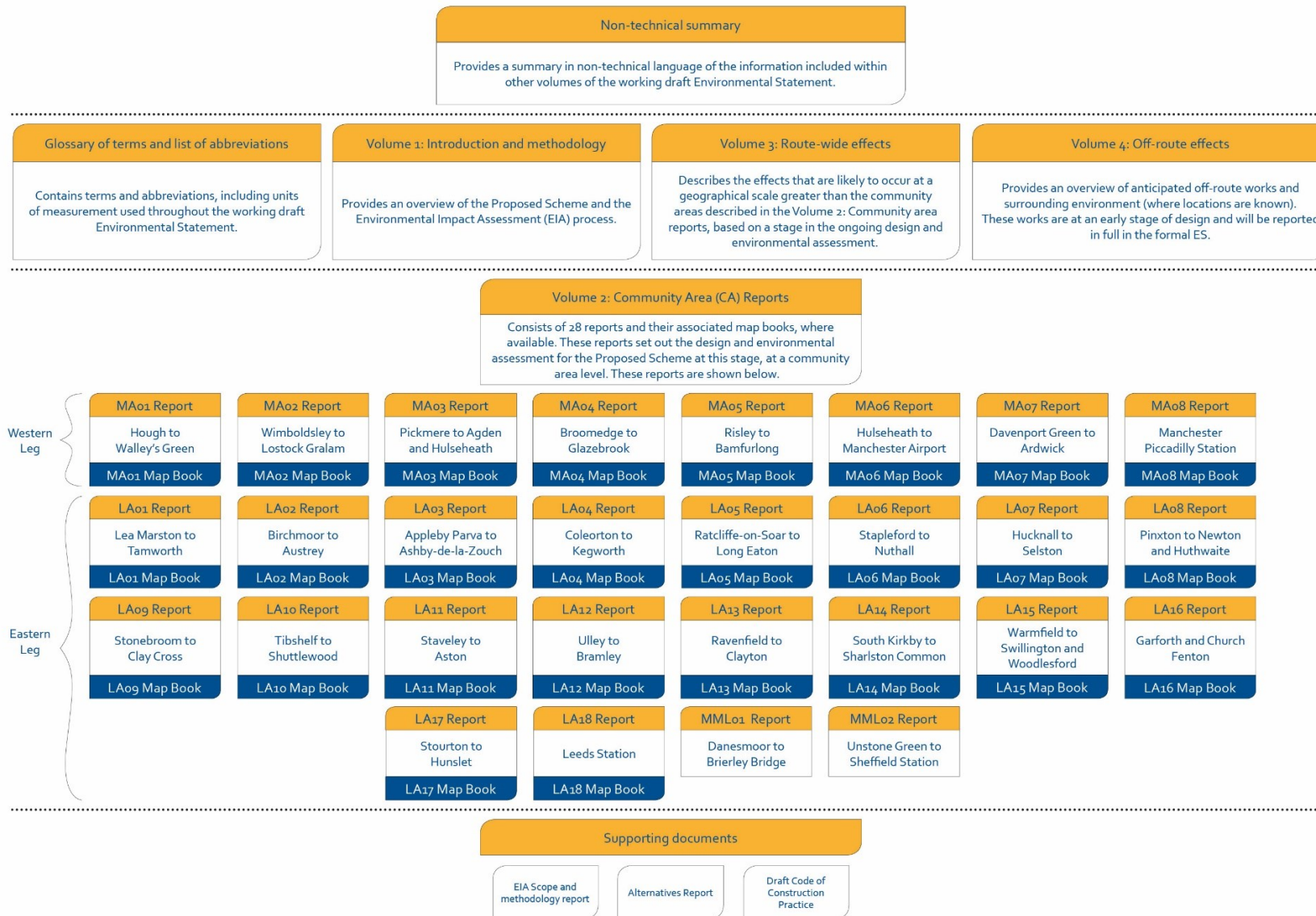
Volume 4: Off-route effects

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

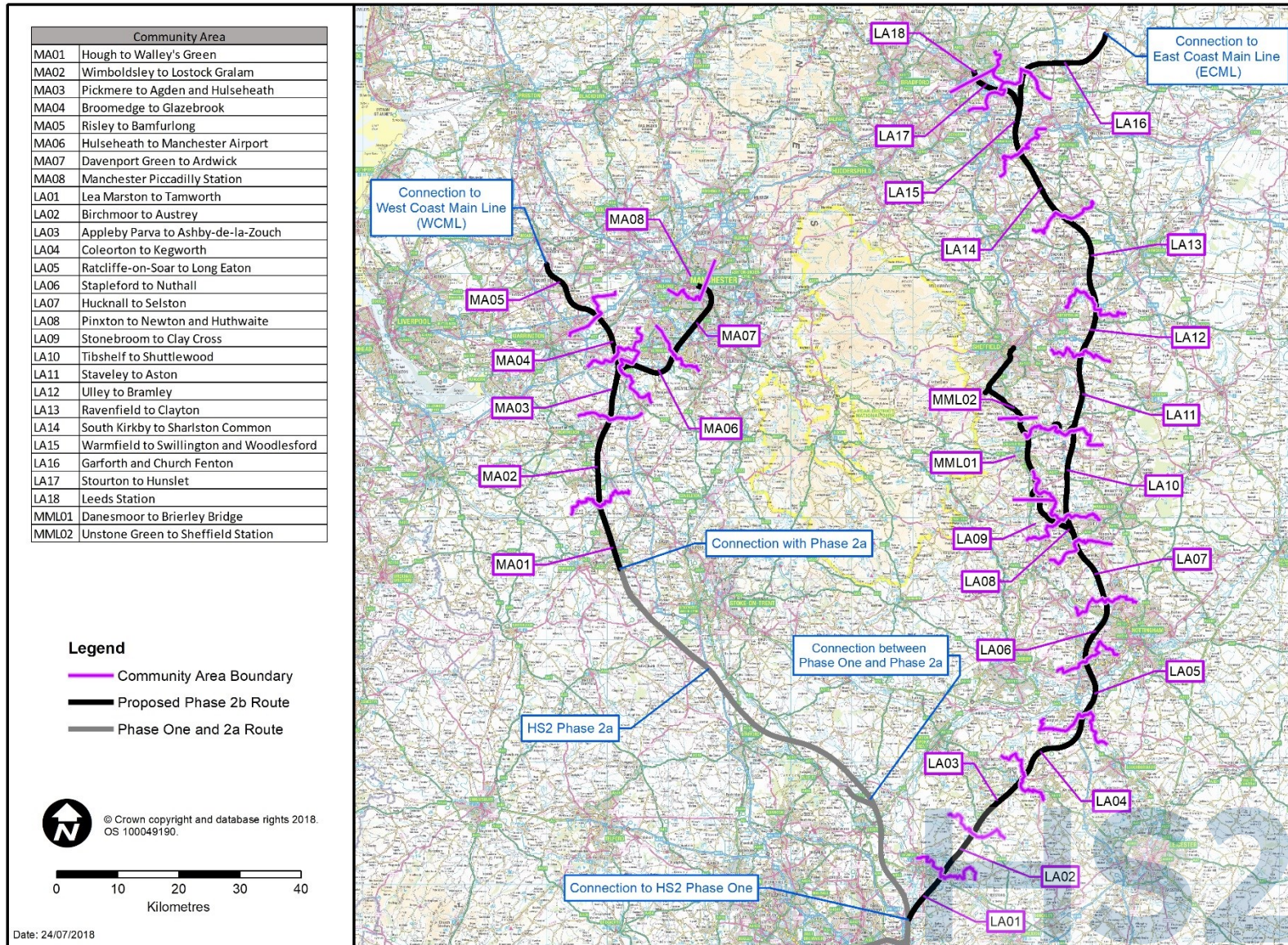


1 Introduction

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 Ulley to Bramley area (CA number LA12) which is located on the eastern leg of the Proposed Scheme.

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



1.2 Purpose of this report

- 1.2.1 This working draft ES sets out the 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 Ulley to Bramley 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

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- 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 Ulley to Bramley area are provided in a separate corresponding document entitled Volume 2: LA12 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: LA12 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

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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

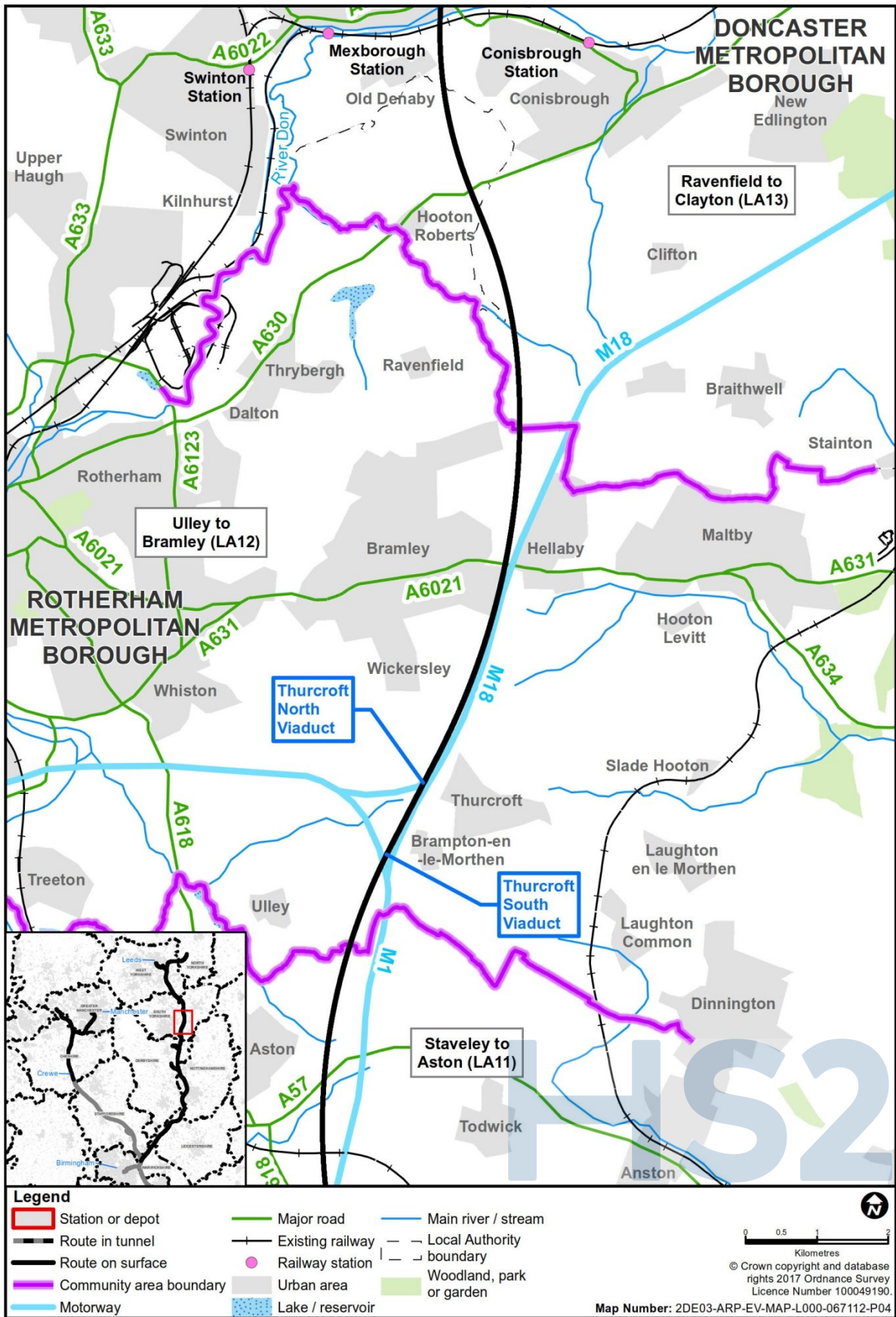
- 2.1.1 The Proposed Scheme through the Ulley to Bramley area would be approximately 7.7km long and lies within the local authority area of Rotherham Metropolitan Borough Council (RMBC).
- 2.1.2 The Proposed Scheme would pass through the parishes of Ulley, Thurcroft, Whiston, Wickersley, Bramley and Ravenfield. The boundary between Aston cum Aughton parish and Ulley parish forms the southern boundary of this area; the boundary between Ravenfield and Conisbrough Parks parish forms the northern extent of this section.
- 2.1.3 As shown in Figure 3, the Staveley to Aston area (LA11) lies to the south, and the Ravenfield to Clayton area (LA13) lies to the north of the Ulley to Bramley area.

Settlement, land use and topography

- 2.1.4 The Ulley to Bramley area is predominantly rural in character, with agriculture being the main land use. This is interspersed with areas of open moorland, farmland, occasional areas of woodland and some towns, villages and hamlets including Brampton-en-le-Morthen, Thurcroft, Bramley and Ravenfield.
- 2.1.5 The southern part of the Proposed Scheme would be located in proximity to the Penny Hill wind farm near Ulley, and cross the M1/M18 at junction 32. This part of the Ulley to Bramley area is situated in an upland and rural setting.
- 2.1.6 The route would continue northwards through an area of open countryside before passing into a more urban and residential landscape at Bramley. The route would continue northwards immediately to the west of the M18 before diverging to the north-west at Bramley. The northern part of the Proposed Scheme in the Ulley to Bramley area would be located in a more urban setting.
- 2.1.7 The topography of the Ulley to Bramley area is undulating with the highest point located at Penny Hill (105m above Ordnance Datum (AOD)).

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Figure 3: Community area context map



Key transport infrastructure

- 2.1.8 The M1 and M18 pass through the Ulley to Bramley area. The A631 Bawtry Road also passes through the area in a west to east alignment, providing links between Rotherham and Bawtry via Wickersley and Hellaby. Local roads include Carr Lane, Penny Hill Lane, Brampton and Wood Lane, B6060 Morthen Road, Moat Lane, Slacks Lane, Sandy Lane and Lidget Lane.
- 2.1.9 The route of the Proposed Scheme would cross several public rights of way (PRoW) including local access roads and public footpaths, which provide links between scattered dwellings and surrounding villages. This also includes the promoted 'Doorstop walk no.18' within Wickersley Wood.

Socio-economic profile

- 2.1.10 Within the RMBC area there is a wide range of business types present, reflecting a diversity of commercial activities within the rural area. The construction sector accounts for the largest proportion of businesses (14%) followed by retail (11%), and professional, scientific and technical activities (10%)⁴.
- 2.1.11 According to the Annual Population Survey (2016),⁵ the employment rate⁶ within the RMBC area was 67% (106,000 people). The unemployment rate within the RMBC area was 7% (7,500 people). According to the Annual Population Survey (2016)⁷, 25% of RMBC's residents aged 16-64 were qualified to National Vocational Qualification Level 4 (NVQ4) or above, while 12% of residents had no qualifications.

Notable community facilities

- 2.1.12 The Ulley to Bramley area is predominantly rural, made up of a few small settlements on either side of the M18. The main concentrations of community facilities are located in Rotherham and local larger settlement centres, such as Thurcroft, Bramley and Wickersley.
- 2.1.13 Thurcroft village, provides a range of community facilities including Thurcroft Infant School; Thurcroft Junior Academy; The Willows School; Gordon Bennett Memorial Hall; Thurcroft Welfare Community Hall; St Simon and St Jude-Thurcroft Parish Church, Miners Welfare Institute, and a nursing home.
- 2.1.14 Bramley village has a number of community facilities including Bramley Sunnyside Infant and Junior School; Bramley Grange Primary School; the Bill Chafer Youth Centre; St Francis Church; and Bramley Village Hall.
- 2.1.15 Community facilities in Wickersley village include Wickersley Northfield Primary School; Wickersley School and Sports College; St Albans Church; Blessed Trinity Catholic Church; Wickersley Methodist Church; and a community centre.

⁴ Office for National Statistics, (2017), UK Business Count-Local Units 2017. Available online at <https://www.nomisweb.co.uk>.

⁵ Office for National Statistics, (2016), Annual Population Survey 2016, NOMIS. Available online at <https://www.nomisweb.co.uk>.

⁶ The proportion of working age (16-64 year olds) residents that is in employment

⁷ Office for National Statistics, (2016), Annual Population Survey 2016, NOMIS. Available online at <https://www.nomisweb.co.uk>.

- 2.1.16 Brampton-en-le-Morthen, Morthen, and Hellaby are villages and hamlets within the Ulley to Bramley area that are predominantly residential in nature, although some provide a small number of local services.
- 2.1.17 Outside of the main settlements, the area is characterised by clusters of dwellings within rural areas.

Recreation, leisure and open space

- 2.1.18 The Ulley to Bramley area is crossed by several PRoW including the promoted 'Doorstop walk no.18' within Wickersley Wood.
- 2.1.19 Bannatyne Health Club is located on the edge of Bawtry Retail Park. Moat Wood is located off Moat Lane and comprises an area of deciduous woodland.
- 2.1.20 Brampton Road allotments are located off Brampton Road to the west of Thurcroft and to the east of the M18. The allotments comprise approximately 35 plots.

Policy and planning context

Planning framework

- 2.1.21 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.
- 2.1.22 The following adopted local plan documents have been considered and referred to where appropriate to the assessment:
- Rotherham Core Strategy (2014)⁸;
 - Barnsley, Doncaster and Rotherham Joint Waste Core Strategy (2012)⁹;
 - Saved Policies of the Rotherham Unitary Development Plan: Written Statement and Proposals Map (1999)¹⁰; and
 - The Sheffield City Region Transport Strategy and Implementation Plan (2011)¹¹.
- 2.1.23 Emerging policies are not generally included within this report unless a document has been submitted for examination to the Secretary of State. This is the case with the Rotherham Local Plan Sites and Policies document, which was submitted to the Secretary of State on 24 March 2016.

⁸ Rotherham Metropolitan Borough Council, (2014), Rotherham Core Strategy. Available online at: http://www.rotherham.gov.uk/downloads/200074/planning_and_regeneration.

⁹ Barnsley Metropolitan Borough Council, Rotherham Metropolitan Borough Council, and Doncaster Metropolitan Borough Council (2012) Barnsley, Doncaster and Rotherham Joint Waste Core Strategy. Available online at: http://www.rotherham.gov.uk/downloads/200074/planning_and_regeneration.

¹⁰ Rotherham Metropolitan Borough Council, (1999), Saved Policies of the Rotherham Unitary Development Plan. Available online at: http://www.rotherham.gov.uk/corestrategyexamination/info/2/core_strategy_examination/6/unitary_development_plan.

¹¹ Sheffield City Region (2011), Sheffield City Region Transport Strategy (2011-2026). Available online at: <http://www.syltp.org.uk/strategy.aspx>.

Committed development

- 2.1.24 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.
- 2.1.25 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.
- 2.1.26 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.
- 2.1.27 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

- 2.1.28 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 associated replacement floodplain storage area;
 - development of proposed temporary and permanent utility diversions;
 - refinement of the realigned roads and PRow crossing the Proposed Scheme;
 - refinement of drainage features required for rail and modified highways;
 - refinement of maintenance access routes and access to balancing ponds;
 - additional environmental features required to mitigate likely significant environmental effects;
 - identification of accommodation works and crossings to provide for private means of access;
 - refinement of construction compound locations and site haul routes; and
 - refinement of grid supply point, auto-transformer stations and auto-transformer feeder station locations.
- 2.1.29 A power supply required to operate the Proposed Scheme would come from the national distribution network and connect to the Proposed Scheme via an auto-transformer feeder station. Connections from the distribution network to the auto-

transformer feeder station would require new transmission lines; these would be buried or overhead lines, or a combination of both. In the Ulley to Bramley area, an auto-transformer feeder station is proposed at the M1/M18 interchange. It is currently anticipated that the transmission lines to connect to the distribution network could extend for up to 1.5km between the network and the auto-transformer feeder station. Further studies to consider the route and design of these transmission lines are ongoing, informed by continued engagement with the statutory provider, and will be reported in the formal ES.

2.2 Description of the Proposed Scheme

- 2.2.1 The following section describes the main features of the Proposed Scheme in the Ulley to Bramley area, including any 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.
- 2.2.3 In general, features are described from south to north along the route, and east to west for features that cross the Proposed Scheme.

Overview

- 2.2.4 The route of the Proposed Scheme through the Ulley to Bramley area would be approximately 7.7km in length. The route would extend from Ulley and Penny Hill, to the south-west of Thurcroft in the south, and travel northwards towards Bramley and Ravenfield.
- 2.2.5 This section of route is illustrated on maps CT-06-461 to CT-06-466a in the Volume 2: LA12 Map Book.
- 2.2.6 All dimensions in the sections below are approximate.
- 2.2.7 In the Ulley to Bramley area, the route of the Proposed Scheme would be carried on the following features:
- viaducts for a total length of 1.1km (Thurcroft South and Thurcroft North viaducts);
 - cuttings for a total length of 3.8km (Springvale, Bramley South and Bramley North cuttings); and
 - embankments for a total length of 2.8km (Ulley, Brampton-en-le-Morthen, Springvale, King's Pond and Bramley embankments).
- 2.2.8 The Proposed Scheme is described in four separate sections below.
- 2.2.9 In general, features are described along the route of the Proposed Scheme from south to north and to the western and eastern sides of the route as they cross the Proposed Scheme, as shown on Map Series CT-06 in the Volume 2: LA12 Map Book.

Ulley embankment to Brampton-en-le-Morthen embankment

2.2.10 The route of the Proposed Scheme would continue from the Staveley to Aston area (LA11) northwards into the Ulley to Bramley area, north-east of Aston, to the west of the M1. The route would continue on the Ulley embankment, travelling north over of the M1/M18 junction, west of Brampton-en-le-Morthen. It would continue onto the Thurcroft South viaduct before transferring onto the Brampton-en-le-Morthen embankment located inside the island area created by the M1/M18 junction.

2.2.11 This section of the route is illustrated on Maps CT-06-461 and CT-06-462 in the Volume 2: LA12 Map Book.

2.2.12 Key features of this 2.1km section would include:

- a section of Ulley embankment, 1.2km in length and up to 21m in height, continuing from the Staveley to Aston area (LA11), with landscape earthworks on both sides of the route to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: Map CT-06-461, D5 to Map CT-06-461, C6);
- realignment of Carr Lane, 130m north of its existing alignment for 490m, crossing the route of the Proposed Scheme via Carr Lane underbridge (see Volume 2: Map CT-06-461, E4 to D7);
- Carr Lane underbridge, 13m in length, with a height clearance of 9.5m (see Volume 2: Map CT-06-461, E4 to E5);
- Penny Hill South culvert, 470m south-west of Ulley Beeches, for surface water drainage under the route of the Proposed Scheme (see Volume 2: Map CT-06-461, E5 to E7);
- area of landscape mitigation planting, to the west of the Proposed Scheme, to help integrate the Proposed Scheme into the landscape see (Volume 2: Map CT-06-461, F3);
- two replacement floodplain storage areas on the east side of the route of the Proposed Scheme, 300m and 110m south of Ulley Beeches. Following excavation, the area would be re-graded back to tie into the existing ground level (see Volume 2: Map CT-06-461, F7 and G7);
- Penny Hill North culvert, 260m south-west of Ulley Beeches, for surface water drainage under the route of the Proposed Scheme (see Volume 2: Map CT-06-461, G5 to G7);
- Penny Hill Lane underbridge, 27m in length, with a height clearance of 12m to carry Penny Hill Lane under the route of the Proposed Scheme on its existing alignment (see Volume 2: Map CT-06-462, A5 to A6);
- areas of landscape mitigation planting on both sides of the route of the Proposed Scheme, to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: Map CT-06-462, A4 to B6);

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- an ecological mitigation pond would be located to the west of the route of the Proposed Scheme to provide replacement habitat for great crested newts (see Volume 2: Map CT-06-462, A5);
- Thurcroft South viaduct, 416m in length and up to 17m in height crossing over the M1. A noise fence barrier east of the route of the Proposed Scheme, 180m in length and 2m in height above rail, extending from the approximate midpoint of the viaduct to the Brampton-en-le-Morthen embankment, to provide acoustic screening for properties in Brampton-en-le-Morthen (see Volume 2: Map CT-06-462, B5 to E6);
- diversion of Thurcroft Bridleway 7, 240m west of its existing alignment for 605m, and connecting with Brampton Lane on the western side of the route of the Proposed Scheme (see Volume 2: Map CT-06-462, G4 to D5);
- Brampton-en-le-Morthen embankment, 512m in length and up to 19m in height, with landscape mitigation planting on both sides of the route to help integrate the Proposed Scheme into the surrounding landscape. A noise fence barrier, east of the route of the Proposed Scheme, up to 2m in height above rail, to provide acoustic screening for properties in Brampton-en-le-Morthen (see Volume 2: Map CT-06-462, D5 to G6);
- Thurcroft auto-transformer feeder station¹², within an area of landscape mitigation planting, on the western side of the route of the Proposed Scheme, 200m west of the Brampton-en-le-Morthen. Access would be provided via an access road from Wood Lane (see Volume 2: Map CT-06-462, E4 to F5);
- two ecological mitigation ponds would be located to the west of the route of the Proposed Scheme to provide replacement habitat for great crested newts (see Volume 2: Map CT-06-462, G2); and
- a balancing pond for railway drainage from the Proposed Scheme, located 350m north-west of Brampton-en-le-Morthen, with access provided from Brampton Lane where it joins the diverted Thurcroft bridleway 7 (see Volume 2: Map CT-06-462, G5 to H5).

2.2.13 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.

2.2.14 Construction of this section would be managed from the Ulley embankment satellite compound and Brampton-en-le Morthen satellite compound, which are described in Section 2.3, and shown on Map CT-05-462 in the Volume 2: LA12 Map Book.

¹² Grid connections from existing electrical infrastructure to the HS2 Phase 2b route are required to provide traction power to the Proposed Scheme; without this traction power the trains could not operate. Power will be supplied via the auto-transformer feeder station which houses the electrical equipment that protects and controls the power lines.

Thurcroft North viaduct to King's Pond Plantation embankment

- 2.2.15 The route would continue from the Brampton-en-le-Morthen embankment following the M18 corridor to the Thurcroft North viaduct. The route would continue in a north-easterly direction over the Springvale embankment, passing Thurcroft on the eastern side of the Proposed Scheme. The route would continue in Springvale cutting, through a section of Moat Wood, before passing onto King's Pond Plantation embankment, which would pass to the east of King's Pond Plantation.
- 2.2.16 This section of route is illustrated on Maps CT-06-462 to CT-06-464 in the Volume 2: LA12 Map Book.
- 2.2.17 Key features of this 2.5km section of the route would include:
- Thurcroft North viaduct, 640m in length and up to 22m in height, crossing over the M18. A noise fence barrier east of the route of the Proposed Scheme, 2m in height above rail, to provide acoustic screening for properties in Brampton-en-le-Morthen and Thurcroft (see Volume 2: Map CT-06-462, G6 to Map CT-06-463, C5);
 - a replacement floodplain storage area on the west of the route of the Proposed Scheme, 30m west of the M18. Following excavation, the area would be re-graded back to tie into the existing ground level (see Volume 2: Map CT-06-463, B5);
 - Springvale embankment, 322m in length and up to 8m in height with landscape mitigation planting on both sides to help integrate the Proposed Scheme into the surrounding landscape. A noise fence barrier east of the route of the Proposed Scheme, 2m in height above rail, to provide acoustic screening for properties in Thurcroft (see Volume 2: Map CT-06-463, C5 to D5);
 - realignment of the B6060 Morthen Road, 140m to the south-east of its existing alignment on an embankment, 1.2km long and up to 18m in height. The realigned B6060 Morthen Road would cross the route of the Proposed Scheme on the B6060 Morthen Road overbridge, up to 16m above existing ground level and 11m above track level. The existing B6060 Morthen Road would be closed where it would cross the route of the Proposed Scheme and retained as access to both sides of the route for properties on B6060 Morthen Road (see Volume 2: Map CT-06-463, E1 to D7 and Map CT-06-463-L1, F7 to D10);
 - a grid supply point located, within an area of landscape mitigation planting on the western side of the route of the Proposed Scheme, 40m south of the B6060 Morthen Road. Access would be provided via an access road from the realigned B6060 Morthen Road (see Volume 2: Map CT-06-463, C2 to D3);
 - a balancing pond for highway drainage from the realigned B6060 Morthen Road on the western side of the Proposed Scheme. Access would be provided from the realigned B6060 Morthen Road (see Volume 2: Map CT-06-463, D3);
 - an area of landscape mitigation planting to the west of the route of the Proposed Scheme, to help integrate the Proposed Scheme into the

surrounding landscape and provide screening for residents in Morthen (see Volume 2: Map CT-06-463, C5 to E5 and D2);

- Nether Moor drop inlet culvert¹³, 450m south of King's Pond Plantation, for the diversion of a tributary of Morthen Brook under the route of the Proposed Scheme (see Volume 2: Map CT-06-463, D5 to D6);
- areas of landscape mitigation planting on both sides of the route of the Proposed Scheme to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: Map CT-06-463, D5 to E6);
- Springvale cutting, 1km in length, up to 14m in depth and 115m in width, with landscape mitigation planting to the east side of the route to help integrate the route of the Proposed Scheme into the landscape. At the base of the cutting and extending north from the Springvale embankment for around 300m, a noise fence barrier on the eastern side, 290m in length and up to 2m in height above rail, and on the western side, 300m in length and up to 3m above rail. These noise fence barriers would provide acoustic screening for properties on the existing B6060 Morthen Road and for properties in Thurcroft (see Volume 2: Map CT-06-463, E5 to Map CT-06-464, B5);
- Moat Lane would be closed where it would cross the route of the Proposed Scheme at the Springvale cutting. A turning head would be provided to facilitate vehicle access on the retained section of Moat Lane on the western side of the Proposed Scheme (see Volume 2: Map CT-06-463, G5);
- an area of landscape mitigation planting to the west of the route of the Proposed Scheme to help integrate the Proposed Scheme into the surrounding area and provide replacement habitat at Moat Wood (see Volume 2: Map CT-06-463, G4 to H5);
- diversion of Wickersley Footpath 9, 130m west of its existing alignment for 445m, crossing the Proposed Scheme on the Wickersley Footpath 9 accommodation overbridge (see Volume 2: Map CT-06-463, I5 to Map CT-06-464, B5);
- Wickersley Footpath 9 accommodation overbridge, 95m in length and 7.2m above track level (see Volume 2: Map CT-06-463, H6 to Map CT-06-464, B5, and Map CT-06-463, H5);
- diversion of Wickersley Footpath 8b, 115m south of its existing alignment for 170m, crossing the Proposed Scheme on the Wickersley Footpath 9 accommodation overbridge (see Volume 2: Map CT-06-463, H5 to H6);

¹³ A drop inlet culvert comprises a circular pipe or rectangular box culvert, usually with an inlet weir and open stepped 'cascade' on the upstream side to dissipate energy. Drop inlet culverts are used when a watercourse (or dry valley) crosses the route or road in cutting or close to existing ground level.

- King's Pond Plantation embankment, 475m in length and up to 9m in height, with landscape mitigation planting on both sides of the route to help integrate the Proposed Scheme in to the surrounding landscape (see Volume 2: Map CT-06-464, D5 to B5);
- King's Pond Plantation culvert, 70m east of King's Pond Plantation, for the realignment of Kingsforth Brook under the route of the Proposed Scheme (see Volume 2: Map CT-06-464, C5 to C6); and
- an area of landscape mitigation planting to the west of the route of the Proposed Scheme, to provide replacement habitat and visual screening for properties at Slacks Farm (see Volume 2: Map CT-06-464, C5).

2.2.18 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.

2.2.19 Construction of this section would be managed from the Brampton-en-le-Morthen embankment satellite compound, B6060 Morthen Road satellite compound and Springvale embankment main compound, which are described in Section 2.3 and shown on maps CT-05-463 and CT-05-463 L1 in Volume 2: LA12 Map Book.

Bramley South cutting to A631 Hellaby Roundabout North overbridge

2.2.20 The route would continue from the King's Ponds Plantation embankment northwards to the west of the M18, and east of Slacks Farm where it would continue to the Bramley South cutting and Sandy Lane overbridge. The cutting would continue along the corridor between Bramley and the M18, crossing under the A631 Hellaby roundabout overbridges. The Bramley South cutting would continue onto the Bramley embankment.

2.2.21 This section of route is illustrated on Maps CT-06-464 to CT-06-465 in the Volume 2: LA12 Map Book.

2.2.22 Key features of this 1.3km section of the route would include:

- Bramley South cutting, 1.3km in length, up to 16m in depth and 69m in width. A noise fence barrier, west of the route of the Proposed Scheme, 720m in length and 2m in height, located along the top of the Bramley South cutting, to provide acoustic screening to residents in Bramley including Sherbourne Avenue and Westerton Drive (see Volume 2: Map CT-06-464, D5 to Map CT-06-465, C5);
- areas of landscape mitigation planting on both sides of the route of the Proposed Scheme, to help integrate the Proposed Scheme into the surrounding landscape and provide visual screening to properties in Bramley, including Sherbourne Avenue (see Volume 2: Map CT-06-464, D5 to F6);
- three ecological mitigation ponds would be located to the west of the route of the Proposed Scheme to provide replacement habitat for great crested newts (see Volume 2: Map CT-06-464, E5 to F5);

- Sandy Lane overbridge, 25m in length, and up to 2m in height above ground level and 9.4m above track level (see Volume 2: Map CT-06-464, G5 to G6);
- an area of landscape mitigation planting to the west of the route of the Proposed Scheme, to help integrate the Proposed Scheme into the surrounding landscape and provide visual screening to properties in Bramley, including Sherbourne Avenue and Westerton Drive (see Volume 2: Map CT-06-464, G5 to I5);
- diversion of Bramley Footpath 7 where it would cross the route of the Proposed Scheme with access to properties retained to the west of the route. Users would be diverted along Bramley Footpath 7, 105m to the west of its existing alignment, 320m in length, between Sandy Lane, Sherbourne Avenue and Westerton Drive (see Volume 2: Map CT-06-464, H5 to G5);
- an area of landscape mitigation planting to the west of the route of the Proposed Scheme on the existing Bramley Footpath 7, to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: Map CT-06-464, I2 to I3);
- extension to the west of the A631 Bawtry Road roundabout by 60m extending from the M18 junction 1. The westbound carriageway would cross the route of the Proposed Scheme on the A631 Hellaby Roundabout South overbridge and the eastbound carriageway would cross on the Hellaby Roundabout North overbridge. This would also include works to the M18 northbound slip roads (see Volume 2: Map CT-06-465, B5 to B6);
- areas of landscape mitigation planting to the west of the route of the Proposed Scheme, to help integrate the Proposed Scheme into the surrounding landscape along the A631 Bawtry Road (see Volume 2: Map CT-06-465, C2 to C4);
- A631 Hellaby Roundabout South overbridge, 42m in length, up to 1m above ground level and 9.5m above track level (see Volume 2: Map CT-06-465, C5); and
- A631 Hellaby Roundabout North overbridge, 42m in length, up to 3m above ground level and 9.5m above track level (see Volume 2: Map CT-06-465, C5).

2.2.23 There would 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.

2.2.24 Construction of this section would be managed from the Bramley South cutting satellite compound and Bramley embankment satellite compound, which are described in Section 2.3 and shown on maps CT-05-464 and CT-05-465 in the Volume 2: LA12 Map Book.

Bramley South cutting to Common Lane overbridge

- 2.2.25 The Proposed Scheme would continue after the A631 Hellaby Roundabout North overbridge in the Bramley South cutting, and would then continue onto the Bramley embankment, and into the Bramley North cutting to the end of the Ulley to Bramley area.
- 2.2.26 This section of route is illustrated on Maps CT-06-465 to CT-06-466a in the Volume 2: LA12 Map Book.
- 2.2.27 Key features of this 1.9km section of the route would include:
- continuation of the Bramley South cutting, 200m in length, up to 13m in depth and 56m in width. A noise fence barrier, located at the base of the cutting west of the route of the Proposed Scheme, 3m in height above rail, to provide acoustic screening for properties in Bramley (see Volume 2: Map CT-06-465, C5 to D6);
 - areas of landscape mitigation planting, to the west of the route of the Proposed Scheme, along A631 Bawtry Road and Bramley South cutting, to provide visual screening for properties in Hellaby and help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: Map CT-06-465, C2 to D5);
 - an ecological mitigation pond would be located to the west of the route of the Proposed Scheme to provide replacement habitat for great crested newts (see Volume 2: Map CT-06-465, E5);
 - Bramley embankment, 360m in length and up to 6.5m in height with landscape mitigation planting. A noise fence barrier, west of the route of the Proposed Scheme, 3m in height above rail, to provide acoustic screening for properties in Bramley (see Volume 2: Map CT-06-465, D6 to F6);
 - an area of landscape mitigation planting to the east of the route of the Proposed Scheme, to help integrate the Proposed Scheme into the surrounding landscape and provide replacement habitat (see Volume 2: Map CT-06-465, D6 to E6);
 - Bramley Lings culvert, 430m north of A631 Bawtry Road, for the diversion of a tributary of Hellaby Brook under the route of the Proposed Scheme. Access would be provided from the A631 Bawtry Road to the south (see Volume 2: Map CT-06-465, E5 to E6);
 - three ecological mitigation ponds would be provided to the east of the route of the Proposed Scheme to provide replacement habitat for great crested newts (see Volume 2: Map CT-06-465, E6);
 - Bramley North cutting, 1.3km in length, up to 21m in depth and 160m width in this section. A noise fence barrier extending north from the Bramley embankment, located at the base of the cutting west of the route of the Proposed Scheme, 170m in length and 3m in height above rail, to provide acoustic screening to properties in Bramley (see Volume 2: Map CT-06-465, F5 to G5);

- a balancing pond for railway drainage from the Proposed Scheme to the east of the route of the Proposed Scheme. Access would be provided from Lidget Lane to the north of the balancing pond (see Volume 2: Map CT-06-465, F6 to G7);
- an area of landscape mitigation planting to the east of the Bramley North cutting, to help integrate the Proposed Scheme into the surrounding landscape and provide visual screening for Hellaby Park Farm (see Volume 2: Map CT-06-465, I6 to Map CT-06-466a, C6);
- Lidget Lane overbridge, 180m in length, up to 0.6m above existing ground level and 11.5m above track level to carry Lidget Lane over the route of the Proposed Scheme on its existing alignment (see Volume 2: Map CT-06-466a, B5 to C6);
- a replacement floodplain storage area on the western side of the route of the Proposed Scheme, north of Lidget Lane. Following excavation, the area would be re-graded back to tie into the existing ground level (see Volume 2: Map CT-06-466a, C3 to C4);
- Hellaby Brook inverted siphon, 270m north of Lidget Lane, for the realignment of Hellaby Brook under the route of the Proposed Scheme. Access would be provided from Braithwell Road to the north (see Volume 2: Map CT-06-466a, D5 to D6);
- Bramley auto-transformer station, 49m by 24m, on the eastern side of the route of the Proposed Scheme, 250m north of Lidget Lane. Access would be provided via an access road from Lidget Lane (see Volume 2: Map CT-06-466a, D6); and
- Common Lane overbridge, 100m in length, up to 2m above ground level and 10.6m above track level, to carry Common Lane over the route of the Proposed Scheme on its existing alignment (see Volume 2: Map CT-06-466a, E5 to E6).

2.2.28 There would be maintenance access routes and hedgerow planting throughout this section. There would also be minor utilities works within this section, which may include works to low voltage overhead or underground lines, gas pipes, sewers and telecommunication cables.

2.2.29 Construction of this section would be managed from Bramley embankment satellite compound, Bramley North cutting satellite compound and Common Lane overbridge satellite compound, which are described in Section 2.3 and shown on maps CT-05-465 and CT-05-466a in the Volume 2: LA12 Map Book.

Demolitions

2.2.30 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.

- 2.2.31 At this stage of the design development, it is anticipated that demolition of two commercial/business properties (including outbuildings) and five other structures would be required to construct the Proposed Scheme in the Ulley to Bramley 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 Ulley to Bramley area. The construction arrangements described in this section provide the basis for the assessment presented in this ES.
- 2.3.2 Land used only for construction purposes would be restored as agreed with the owner of the land and the relevant planning authority once the construction works in that area are complete.
- 2.3.3 Land would be required permanently for the key features of the Proposed Scheme described in Section 2.2.
- 2.3.4 During the construction phase, public roads and PRow routes would remain open for public use wherever reasonably practicable. Where such routes would cross the Proposed Scheme and require diversion, the alternative road or PRow crossing the Proposed Scheme would be constructed prior to any closure of existing roads or PRow wherever reasonably practicable. Where they would cross the Proposed Scheme in proximity to their existing alignment, a temporary alternative alignment may be required. In some instances, diverted or realigned roads or PRow may need to pass through areas required for construction of the Proposed Scheme. Routes through these areas would be provided where it is safe and reasonably practicable to do so.
- 2.3.5 Volume 1, Section 5 and Section 6 provide details of the permanent features of the Proposed Scheme and typical construction techniques. For the purposes of the environmental assessment, standard construction techniques as provided in Volume 1, Section 6 have been assumed.

Code of Construction Practice

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

2.3.7 In addition, HS2 Ltd has produced a Community Engagement Framework¹⁴ 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.

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

¹⁴ 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

of the CoCP (Section 2 of the CoCP);

- working hours (Section 5);
- management of construction traffic (Section 14); and
- handling of construction materials (Section 15).

Advance works

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

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

Engineering works

Introduction

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

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

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

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

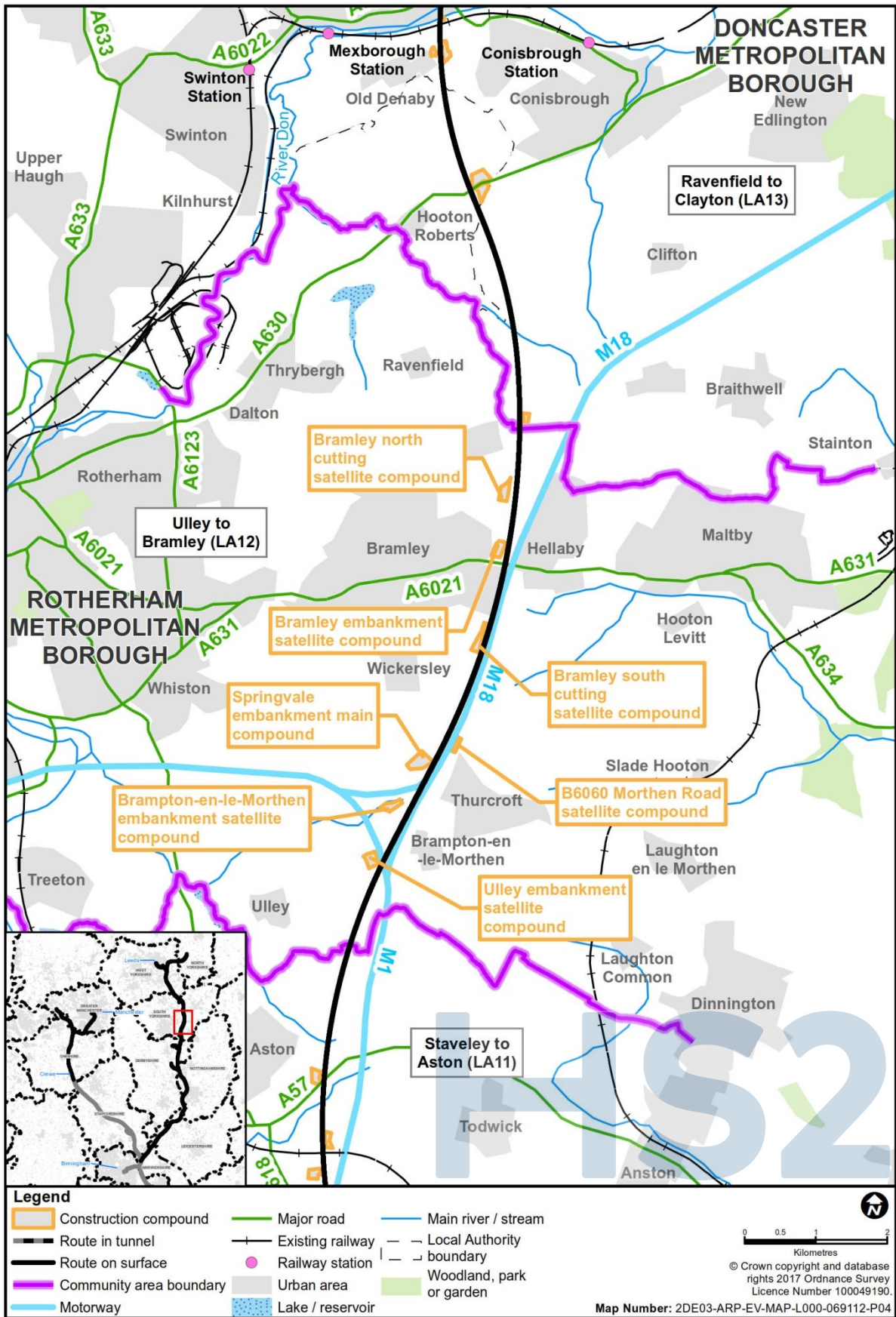
main compounds. Compounds would either be used for civil engineering works, for railway installation works, or for both.

General overview of construction compounds

- 2.3.16 Main compounds would be used for core project management staff (i.e. engineering, planning and construction delivery) and commercial and administrative staff. These teams would directly manage some works and coordinate the works at the satellite compounds. In general, a main compound would include:
- space for the storage of bulk materials;
 - space for the receipt, storage and loading and unloading of excavated material;
 - an area for the fabrication of temporary works equipment and finished goods;
 - fuel storage;
 - plant and equipment storage including plant maintenance facilities; and
 - office space for management staff, limited car parking for staff and site operatives, and welfare facilities.
- 2.3.17 Satellite compounds would be used as the base to manage specific works along a section of the route. Depending on the nature and extent of the works to be managed, these satellite compounds could include office accommodation for staff, local storage for plant and materials, car parking for staff and site operatives, and welfare facilities.
- 2.3.18 One main civil engineering compound, the Springvale embankment main compound, would be located in the Ulley to Bramley area. This would manage six civil engineering satellite compounds in the Ulley to Bramley area, and one civil engineering satellite compound (Common Lane overbridge satellite compound) in the Ravenfield to Clayton area (LA13) (see Volume 2: Community area LA13, Ravenfield to Clayton).
- 2.3.19 Following the completion of civil engineering works, two of these compounds (Brampton-en-le-Morthen embankment satellite compound and Bramley North cutting satellite compound) would remain and be used for railway installation works. These compounds for railway systems installation works would be managed from the Staveley railhead main compound, in the Staveley to Aston (LA11) (see Volume 2: Community area LA11, Staveley to Aston area).
- 2.3.20 The location of construction compounds in the Ulley to Bramley area is shown on Figure 4. Map Series CT-05 (in the Volume 2: LA12 Map Book) show in detail the locations of the construction compounds described below.

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Figure 4: Location of construction compounds in the Ulley to Bramley area



- 2.3.21 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.
- 2.3.22 In the Ulley to Bramley area there would be worker accommodation at Ulley embankment satellite compound for the construction workforce. Details of the location and duration of worker accommodation are provided in the description of the compound.
- 2.3.23 Soil stripped as part of the works, prior to it being used when the land is reinstated, would be stored for the duration of construction. The location of topsoil and subsoil storage areas would generally be adjacent to compounds and areas of construction activity. These areas are referred to as material stockpiles and those adjacent to compounds are shown on maps CT-05-461 to CT-05-466a, in the Volume 2: LA12 Map Book.
- 2.3.24 Further information on the function of compounds is provided in Section 6 of Volume 1 and Section 5 of the draft CoCP. This includes general provisions for the operation of compounds, such as security fencing, lighting, utilities supply, site drainage and codes of worker behaviour.

Construction traffic routes, site haul routes and transfer nodes

- 2.3.25 The movement of construction vehicles, whether to carry materials, plant, other equipment and workforce, or moving empty, would take place within the construction compounds, on public roads and between the compounds and working areas. Where reasonably practicable, movements between the construction compounds and the working areas would be on designated haul routes within the construction site, often along the line of the route of the Proposed Scheme or running parallel to it.
- 2.3.26 The construction compounds would provide the interface between the construction works and the public road or railway network. The likely road routes to access compounds in the Ulley to Bramley area are described in the subsequent sections of this report.
- 2.3.27 It may be necessary to undertake minor works including a number of minor highways and junction improvements along public roads that would be used as construction traffic routes but are at a distance from the route of Proposed Scheme. These minor works will be reported in the formal ES.
- 2.3.28 Areas of land are also required for the storage, loading and unloading of bulk earthworks materials that are moved to and from the site on public roads. These 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-05-461 and Map CT-05-466a in the Volume 2: LA12 Map Book.

Construction compounds

- 2.3.29 This section provides a summary of the civil engineering works to be managed from the construction compounds in the Ulley to Bramley area, as illustrated in Figure 5, and railway system installation works as illustrated in 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

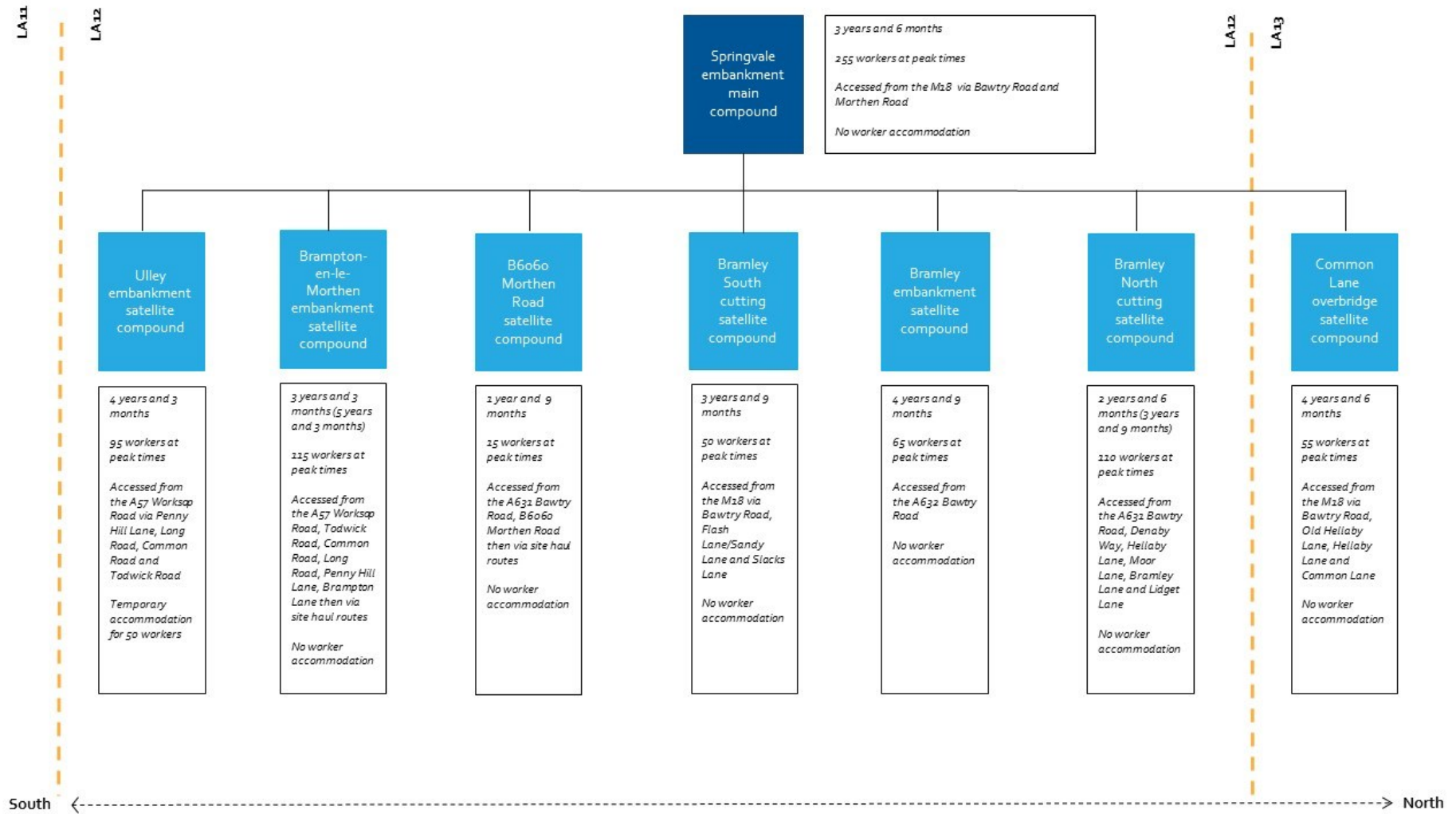
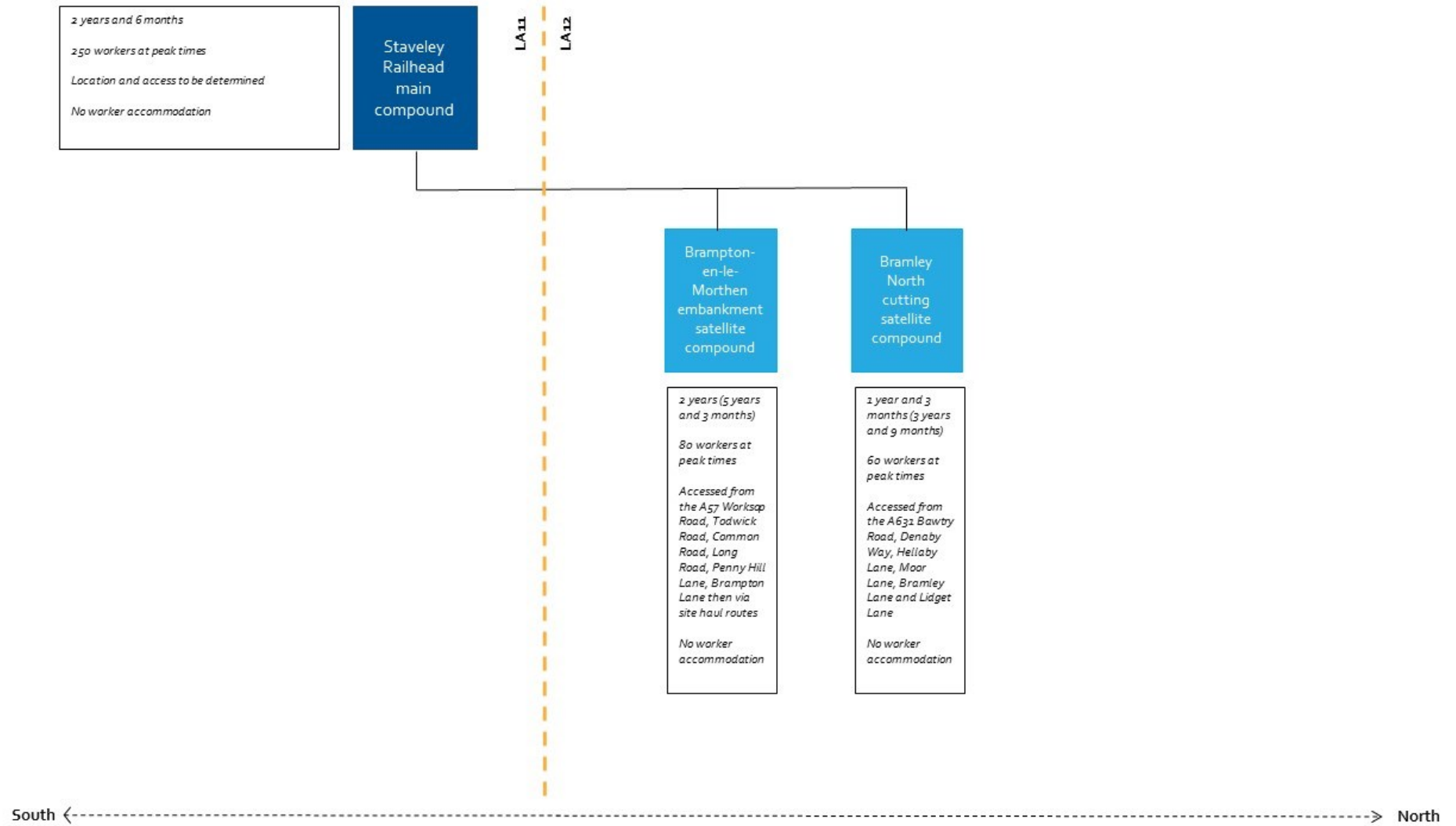


Figure 6: Construction compounds for railway systems works



Springvale embankment main compound

2.3.30 This compound would be used to manage civil engineering works and provide main compound support to seven civil engineering satellite compounds in the Ulley to Bramley area as illustrated in Figure 5 (see Volume 2: Map CT-05-463, B3 to C5).

2.3.31 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 required as a result of the works to be managed from the Springvale embankment main compound

Description	Location	Feature resulting in the demolition
Commercial		
Commercial unit	Located north of Brampton Road allotments, to the rear of residential property on Brampton Lane, Thurcroft.	Springvale embankment
Farm outbuilding	Slacks Farm, Slacks Lane, Bramley	King's Pond Plantation embankment
Other		
Overbridge	Morthen Road bridge over the M18, Thurcroft	B6060 Morthen Road overbridge

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

- Thurcroft North viaduct, which would take two years and six months to complete; and
- Wickersley Footpath 9 accommodation overbridge, which would take one year to complete.

2.3.33 The compound would be used to manage the construction of the following embankments and cuttings:

- Springvale cutting, which would take one year and three months to complete;
- Springvale embankment, which would take nine months to complete; and
- King's Pond Plantation embankment, which would take six months to complete.

2.3.34 This compound would manage a transfer node for the storage and loading and unloading of bulk earthworks materials, which would be moved to and from the site on public roads. The transfer node would be accessed from the realigned B6060 Morthen Road and via site haul routes (Volume 2: Map CT-05-463, B2 to C2).

2.3.35 This compound would be used to manage four temporary material stockpile areas on both sides of the route of the Proposed Scheme (see Volume 2: Map CT-05-463, H4 to J6, and CT-05-464, B6 to D6).

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

- temporary diversion of Wickersley Footpath 8b for a period of one year and six months, with users diverted to the north, passing to the west of the temporary material stockpile on the west side of route of the Proposed Scheme. On completion of construction, Wickersley Footpath 8b would be permanently diverted for 170m, over Springvale embankment onto Wickersley Footpath 9 accommodation overbridge (see Volume 2: Map CT-05-463, I4 to J5); and
- temporary diversion of Wickersley Footpath 9 for a period of two years, with users diverted to the south, passing to the west of the temporary material stockpile on the west side of the route of the Proposed Scheme. On completion of construction, Wickersley Footpath 9 would be permanently diverted for 445m, over Springvale embankment onto Wickersley Footpath 9 accommodation overbridge (see Volume 2: Map CT-05-463, I4 to J5).

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

- Nether Moor drop inlet culvert, to carry a tributary of Morthen Brook under the route of the Proposed Scheme, which would take six months to complete; and
- King’s Pond Plantation Culvert, to carry Kingsforth Brook under the route of the Proposed Scheme, which would take six months to complete.

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

Ulley embankment satellite compound

2.3.39 This compound would be used to manage civil engineering works in the Ulley to Bramley area, as illustrated in Figure 5 (see Volume 2: Map CT-05-462, B4 to C4).

2.3.40 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 Ulley embankment satellite compound

Description	Location	Feature resulting in the demolition
Other		
Wind turbine	Wind turbine located within Penny Hill Wind Farm, near Ulley	Ulley embankment

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

- Carr Lane underbridge, which would take one year to complete;
- Penny Hill Lane underbridge, which would take nine months to complete; and
- Thurcroft South viaduct, which would take two years and three months to complete.

2.3.42 The compound would be used to manage the construction of the Ulley embankment, which would take two years and three months to complete.

2.3.43 This compound would be used to manage four temporary material stockpile areas on both sides of the route of the Proposed Scheme (see Volume 2: Map CT-05-461, F7 to G7, and CT-05-462, A3 to A5).

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

- temporary works on Penny Hill Lane for the construction of Penny Hill underbridge located at Ulley embankment for a period of nine months. Penny Hill Lane would remain open during the construction of Penny Hill underbridge and Ulley embankment. Traffic management measures would be implemented to enable the traffic along Penny Hill Lane during the construction period; and
- a number of weekend/overnight closure of the M1 during construction during a period of two years and three months required for the installation of the Thurnscoe South viaduct deck.

2.3.45 The M1 crossing at Thurcroft viaduct 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 co-ordinated to reduce the overall duration of disruption to the motorway. The traffic management would operate for a period of approximately two years and three months over this length of the M1, and 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.

2.3.46 The works to be managed from this compound would require the following drainage works and watercourse diversions:

- Penny Hill South culvert, to carry surface water drainage under the route of the Proposed Scheme, which would take six months to complete; and
- Penny Hill North culvert, to carry surface water drainage under the route of the Proposed Scheme, which would take six months to complete.

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

Brampton-en-le-Morthen embankment satellite compound

2.3.48 This compound would be used to manage civil engineering in the Ulley to Bramley area, as illustrated in Figure 5 (see Volume 2: Map CT-05-462, F4 to G4), for a period of three years and three months. On completion of civil engineering works, the compound would remain as a satellite compound for railway systems installations for a period of two years.

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- 2.3.49 No demolitions would be required as a result of the works to be managed from this compound.
- 2.3.50 The compound would be used to manage the construction of the following bridges and viaducts:
- Thurcroft South viaduct, which would take two years and three months to complete; and
 - Thurcroft North viaduct, which would take two years and six months to complete.
- 2.3.51 The compound would be used to manage the construction of the Brampton-en-le-Morthen embankment, which would take nine months to complete.
- 2.3.52 This compound would be used to manage one temporary materials stockpile area on the western side of the route of the Proposed Scheme (see Map CT-05-462, E3 to E5).
- 2.3.53 The works to be managed from this compound would require the following works to public roads:
- temporary closure of 580m of Brampton Lane with diversions along Penny Hill Lane and Common Lane for construction of the Thurcroft South, Thurcroft North viaduct and Brampton-en-le-Morthen embankment for a period of two years and three months; and
 - a number of weekend/overnight closures of the M1/M18 slip road during construction during a period of two years and nine months required for the installation of Thurcroft North viaduct deck. On completion of construction, the M1/M18 slip road would be reinstated along its current alignment.
- 2.3.54 The works to be managed from this compound would require temporary diversion of Thurcroft Bridleway 7 for a period of four years during construction. This would divert users for 3.1km via Wood Lane, Brampton Road, Morthen Road and Morthen Hall Lane. On completion of construction, the Thurcroft Bridleway 7 would be diverted to Wood Lane around the west side of the Thurcroft auto-transformer feeder station on the western side of the Brampton-en-le-Morthen embankment.
- 2.3.55 It is currently anticipated temporary or permanent diversions of utilities may be required as a result of the works to be managed from this compound. These will be reported in the formal ES.

B6060 Morthen Road satellite compound

- 2.3.56 This compound would be used to manage civil engineering works in the Ulley to Bramley area, as illustrated in Figure 5 (see Volume 2: Map CT-05-463, D7 to F7).
- 2.3.57 No demolitions would be required as a result of the works to be managed from this compound.
- 2.3.58 The compound would be used to manage the construction of the B6060 Morthen Road overbridge, which would take nine months to complete.

- 2.3.59 The works to be managed from this compound would require permanent realignment of the B6060 Morthen Road, 140m to the south of its existing alignment, which would take nine months to complete and would be constructed offline¹⁵. On completion of construction, a section of B6060 Morthen Road would be permanently closed where it would cross the route of the Proposed Scheme, with access maintained to the properties along B6060 Morthen Road (see Volume 2: Map CT-05-463, D1 to D9).
- 2.3.60 This compound would be used to manage three temporary material stockpile areas on the eastern side of the route of the Proposed Scheme (Volume 2: see Map CT-05-463, C6 to G6).
- 2.3.61 It is anticipated temporary or permanent diversions of utilities may be required as a result of the works to be managed from this compound. This will be reported in the formal ES.

Bramley South cutting satellite compound

- 2.3.62 This compound would be used to manage civil engineering works in the Ulley to Bramley area, as illustrated in Figure 5 (see Volume 2: Map CT-05-464, D5 to F5).
- 2.3.63 No demolitions would be required as a result of the works to be managed from this compound.
- 2.3.64 The compound would be used to manage the construction of the Sandy Lane overbridge, which would take one year to complete.
- 2.3.65 The compound would be used to manage the construction of the Bramley South cutting, which would take three years to complete. This compound would be used to manage one temporary material stockpile area on the western side of the route of the Proposed Scheme (see Volume 2: Map CT-05-464, D4 to E4).
- 2.3.66 The works to be managed from this compound would require the temporary diversion of Sandy Lane for a period of one year, with diversions along A631 Bawtry Road to cross over the A631 Hellaby Roundabout onto Cumwell Lane. On completion of construction, Sandy Lane would cross the route of the Proposed Scheme along its existing alignment over Sandy Lane overbridge.
- 2.3.67 The works to be managed from this compound would require the permanent diversion of Bramley Footpath 7, to the south of its existing alignment, connecting to Sandy Lane for construction of the Proposed Scheme. The permanent diversion would be constructed before closing the existing alignment.
- 2.3.68 It is currently anticipated temporary or permanent diversions of utilities may be required as a result of the works to be managed from this compound. These will be reported in the formal ES.

Bramley embankment satellite compound

- 2.3.69 This compound would be used to manage civil engineering works in the Ulley to Bramley area, as illustrated in Figure 5 (see Volume 2: Map CT-05-465, C4 to E5).

¹⁵Offline works are works which are generally constructed along or nearby existing routes, which will remain open during construction

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2.3.70 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 required as a result of the works to be managed from the Bramley embankment satellite compound

Description	Location	Feature resulting in the demolition
Other		
Three pylons	Land located west of M18	Bramley embankment/Bramley North cutting

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

- A631 Hellaby Roundabout South overbridge, which would take one year to complete; and
- A631 Hellaby Roundabout North overbridge, which would take one year to complete.

2.3.72 The compound would be used to manage the construction of the following embankments and cuttings:

- Bramley South cutting, which would take three years to complete; and
- Bramley embankment, which would take one year to complete.

2.3.73 This compound would manage a transfer node for the storage and loading and unloading of bulk earthworks materials, which would be moved to and from the site on public roads. The transfer node would be accessed from Lidget Lane and via site haul routes (see Volume 2: Map CT-05-465, D6 to H8).

2.3.74 The works to be managed from this compound would require temporary diversion of A631 Hellaby Road for a period of one year and six months, with local diversions to suit traffic management. During this time, the permanent A631 Hellaby Roundabout South and North overbridges would be constructed. Following the construction period, A631 Hellaby Road would be elongated to the west of its existing alignment.

2.3.75 The works to be managed from this compound would require works to Bramley Lings culvert, to carry a tributary of Hellaby Brook under the route of the Proposed Scheme, which would take six months to complete.

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

Bramley North cutting satellite compound

2.3.77 This compound would be used to manage civil engineering works in the Ulley to Bramley area, as illustrated in Figure 5 (see Volume 2: Map CT-05-465, G4 to I5), for a period of two years and six months. On completion of civil engineering works, the compound would remain as a satellite compound for railway systems installations for a period of one year and three months.

- 2.3.78 No demolitions would be required as a result of the works to be managed from this compound.
- 2.3.79 The compound would be used to manage the construction of the Lidget Lane overbridge, which would take nine months to complete.
- 2.3.80 The compound would be used to manage the construction of the Bramley North cutting, which would take nine months to complete.
- 2.3.81 This compound would be used to manage two temporary material stockpile areas on the western and eastern sides of the route of the Proposed Scheme (see Volume 2: CT-05-466a, B3 to D5).
- 2.3.82 The works to be managed from this compound would require temporary local diversion of Lidget Lane during construction for a period of one year, with diversions along A631 Bawtry Road, Denaby Way and Hellaby Lane to join Braithwell Road located 200m east of Lidget Lane. During this time, the Lidget Lane overbridge would be constructed, which would take nine months to complete. Following the construction period, Lidget Lane would be reinstated along its existing alignment over Lidget Lane overbridge.
- 2.3.83 The following permanent diversion of watercourses would be required as a result of the works to be managed from this compound:
- Hellaby Brook inverted siphon, to carry an unnamed watercourse under the route of the Proposed Scheme, which would take six months to complete; and
 - an unnamed watercourse would be diverted through the Hellaby Brook inverted siphon.
- 2.3.84 It is currently anticipated temporary or permanent diversions of utilities may be required as a result of the works to be managed from this compound. These will be reported in the formal ES.

Common Lane overbridge satellite compound

- 2.3.85 This compound would be used to manage civil engineering works in the Ulley to Bramley area, as illustrated in Figure 5 (located within the Ravenfield to Clayton area (LA13) (see Map CT-05-466a, E6 to F6)).
- 2.3.86 No demolitions would be required as a result of the works to be managed from this compound.
- 2.3.87 The compound would be used to manage the construction of the Common Lane overbridge, which would take approximately one year to complete.
- 2.3.88 The compound would be used to manage the construction of the Bramley North cutting, which would take approximately four years and nine months to complete.
- 2.3.89 The works to be managed from this compound would require temporary diversion of Common Lane during construction for a period of one year, with diversions along Braithwell Road, Moor Lane South, Lidget Lane on west side of the HS2 main line and Lidget Lane on east side of the HS2 main line. During this time, the Common Lane

overbridge would be constructed, which would take one year to complete. Following the construction period, Common Lane would be reinstated along its current alignment.

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

Construction waste and material resources

- 2.3.91 Excavated material (excluding topsoil and subsoil) generated across the Proposed Scheme would be reused as engineering fill material or in the environmental mitigation earthworks of the Proposed Scheme, where suitable and reasonably practicable, either with or without treatment.
- 2.3.92 Forecasts of the amount of construction, demolition and excavation waste that would be produced during construction of the Proposed Scheme are reported in Volume 3: Route-wide effects.
- 2.3.93 Local excess or shortfall of excavated material within the Ulley to Bramley area would be managed through the integrated design approach adopted for the Proposed Scheme, with the aim of contributing to an overall balance of excavated material on a route-wide basis. The overall balance of excavated material will be presented in Volume 3 of the formal ES.
- 2.3.94 Forecasts of the amount of waste generated at temporary worker accommodation sites will be reported in the formal ES.

Commissioning of the railway

- 2.3.95 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

- 2.3.96 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

- 2.3.97 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.
- 2.3.98 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.

2.4 Operation of the Proposed Scheme

Introduction

- 2.4.1 This section describes the operational characteristics of the Proposed Scheme in the Ulley to Bramley 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 seven trains per hour each way passing through the Ulley to Bramley area. Services are expected to operate between 05:00 and midnight from Monday to Saturday and 08:00 and midnight on Sunday.
- 2.4.3 In this area, trains would run at speeds of up to 225mph (360kph). The trains would be either single zoom trains or two zoom trains coupled together, depending on demand and time of day.

Maintenance

- 2.4.4 Volume 1, Section 4 describes the maintenance regime for the Proposed Scheme.
- 2.4.5 Asset performance and condition monitoring would be undertaken using asset condition monitoring and unattended measurement systems fitted to the HS2 passenger rolling stock. Intrusive inspections would be carried out during the maintenance period. The maintenance approach would be a combination of risk based, preventative and reactive maintenance.
- 2.4.6 Provision for railway maintenance vehicles along the eastern leg of the route of the Proposed Scheme would be made at the Staveley infrastructure maintenance depot (IMD) in the Staveley to Aston area (LA11). Further information on the Staveley IMD can be found in Volume 2: Community Area Report LA11: Staveley to Aston.

Operational waste and material resources

- 2.4.7 The assessment of the likely significant environmental effects associated with the disposal of operational waste will be undertaken for the Proposed Scheme as a whole and reported in Volume 3: Route-wide effects of the formal ES.
- 2.4.8 Forecasts of the amount of waste arising from track maintenance and ancillary infrastructure and the associated potential significant environmental effects will also be reported in the formal ES.

Monitoring during operation

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

Proposed auto-transformer feeder station and grid supply point locations

- 2.5.1 During the design development process since the announcement of the preferred route in July 2017, consideration has been given to the location of an auto-transformer feeder station at Thurcroft, which would supply electrical power from the National Grid network to the Proposed Scheme. The auto-transformer feeder station would house the electrical equipment that would protect and control the power supply to the Proposed Scheme. The auto-transformer feeder station would be required at the start of a neutral section¹⁶ along the route of the Proposed Scheme at a location with a potential grid supply point to provide grid connection to existing electrical infrastructure.
- 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 A: the auto-transformer feeder station and grid supply point would be located in proximity to each other within an area of existing agricultural fields, on the west side of the route of the Proposed Scheme, adjacent to Thurcroft. The auto-transformer feeder station and grid supply point would be positioned north of the triangle of land formed by the M18/M1 junction, with the auto-transformer feeder station lying close to the route of the Proposed Scheme, and the grid supply point near to the existing overhead power lines adjacent to Morthen Hall Lane. Access to the sites would be from the B6060 Morthen Road;
 - Option B (the Proposed Scheme): the grid supply point would be in the same location as for Option A to connect to the existing overhead power lines adjacent to Morthen Hall Lane. The auto-transformer feeder station would be located within an area of existing agricultural fields within the triangle of land formed by the M18/M1 junction. The auto-transformer feeder station would be located against the high embankment to enable good access to the HS2 main line. Access to the auto-transformer feeder station would be from an upgraded Bramley/Wood Lane. Access to the grid supply point would be from the B6060 Morthen Road; and
 - Option C: the auto-transformer feeder station and grid supply point would be located outside of the triangle of land formed by the M18/M1 junction, north of the B6060 Morthen Road, within an area of existing agricultural fields, on the west side of the route of the Proposed Scheme.
- 2.5.3 Table 4 provides a summary of the outcomes of the preliminary appraisal of the alternative options described above.

¹⁶ A neutral section is an insulated section that prevents two differing electrical sections from touching, by introducing an electrical clearance (an earth section)

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Table 4: Consideration of local alternatives for Thurcroft auto-transformer feeder station

Option	Outcome of analysis	Further action/considerations
Option A	<ul style="list-style-type: none"> • Similar likelihood of impacts on non-designated and designated heritage assets compared to the Proposed Scheme. • Similar ecology and biodiversity impacts to Proposed Scheme. • Similar construction noise impacts from grid supply point at Morthern Hall Farm and residential properties on opposite side of Morthern Road to Proposed Scheme. • Increased construction noise impacts from auto-transformer feeder station at Morthen Hall Farm and at residential properties on opposite side of Morthen Road to the Proposed Scheme. • Similar agricultural impacts to the Proposed Scheme with regard to loss of agricultural land. • Greater landscape and visual impacts from the auto-transformer feeder station compared to the Proposed Scheme. • Similar technical and engineering complexities to the Proposed Scheme. • Shorter construction programme to the Proposed Scheme. • Lower cost compared to the Proposed Scheme. 	This option will not be subject to further consideration.
Option B (the Proposed Scheme)	<ul style="list-style-type: none"> • Similar likelihood of impacts on non-designated and designated heritage assets as Option A, and less likelihood of impacts on non-designated and designated heritage assets compared to Option C. • Similar ecology and biodiversity impacts compared to the alternative options. • Similar construction noise impacts from grid supply point at Morthen Hall Farm and residential properties on opposite side of Morthen Road to Option A. • Less construction noise impacts from auto-transformer feeder station compared to alternative options, due to greater distance to residential areas. • Similar agricultural impacts to alternative options with regard to loss of agricultural land. • Less landscape and visual impacts from the auto-transformer feeder station compared to alternative options. • Fewer technical and engineering complexities to Option C, despite the need for longer cable connection between grid supply point and auto-transformer feeder station. • Longest construction programme compared to the alternative options. • Higher cost compared to Option A, but reduced cost compared to Option C. 	This is the selected option taken forward into the Proposed Scheme.

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Option	Outcome of analysis	Further action/considerations
Option C	<ul style="list-style-type: none"> • Greater likelihood of impacts to the setting of a Grade II listed building to the west of the auto-transformer feeder station compared to the Proposed Scheme. • Similar ecology and biodiversity impacts to the Proposed Scheme. • Greater construction noise impacts from auto-transformer feeder station and grid supply point at Moat Farm and residential properties on Moat Lane/Green Lane compared to Proposed Scheme. • Similar agricultural impacts to the Proposed Scheme with regard to loss of agricultural land. • Greater landscape and visual impacts from the auto-transformer feeder station compared to the Proposed Scheme. • Greater technical and engineering complexities compared to the Proposed Scheme. • Greater cost of construction for the auto-transformer feeder station and grid supply point compared to Proposed Scheme due to modifications required to existing electrical infrastructure. • Similar construction programme to the Proposed Scheme. • Higher cost compared to the Proposed Scheme. 	This option will not be subject to further consideration.

2.5.4 Option B was taken forward into the Proposed Scheme. Overall Option B was the preferred option because, compared to the other options, the auto-transformer feeder station component would have least visibility, fewer construction noise impacts compared to alternative options. Option C would have an increased likelihood to impact on a Grade II listed building to the west of the auto-transformer feeder station and grid supply point than Options A and B. Option C would have more technical and engineering complexities and greater cost to construct than Options A and B.

Bramley cut and cover tunnel

2.5.5 During the design development process since the announcement of the preferred route in July 2017, further consideration has been given to the route of the Proposed Scheme where it would pass Bramley. The route of the Proposed Scheme would need to pass Bramley and under Sandy Lane in a deep cutting, before passing under the M18 junction 1 in a cut and cover tunnel. Design options were available for the Bramley cut and cover tunnel. These options presented opportunities to simplify the construction method, create smaller structures, and reduce the disruption to the existing road network.

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

- Option O: the route would pass to the east of Bramley, in a cut and cover tunnel constructed with piled walls. The structure would be 110m in length, 17m in width and up to 14.5m in height;

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- Option A: the route would pass to the east of Bramley, in a cut and cover tunnel constructed using a 'bottom up' sequence for the box structure. The structure would be 110m in length, 17m in width and up to 14.5m in height;
- Option B: the route would pass to the east of Bramley, in a cut and cover tunnel constructed using a jacked box method for the box structure. The structure would be 85m in length, 17m in width and up to 12m in height; and
- Option C: the route would pass to the east of Bramley, in a retained cut with two individual overbridges, each with a single span over the route of the Proposed Scheme, and concrete piled wall abutments. The overbridges would each be 22.5m in length, with one 23m in width and the second 19m in width. Both overbridges would be up to 7m above track level. A concrete retaining wall would be required between the two overbridges on the west side of the route of the Proposed Scheme, 75m in length and up to 12.5m in height.

2.5.7 Table 5 provides a summary of the outcomes of the preliminary appraisal of the alternative options described above.

Table 5: Consideration of local alternatives for route of the Proposed Scheme through Bramley

Option	Outcome of analysis	Further action/considerations
Option O	<ul style="list-style-type: none"> • Similar air quality, water resources and flood risk, landscape and visual, historic environment, and ecology impacts compared to the Proposed Scheme. • Less land required for construction compared to the Proposed Scheme. • Longer period over which traffic congestion and delays would occur at M18 junction 1 compared to the Proposed Scheme. • Less opportunity to improve traffic flows and throughput following junction reconfiguration compared to the Proposed Scheme. • Greater technical and engineering complexities compared to the Proposed Scheme. • Longer construction programme compared to the Proposed Scheme. • Higher cost compared to the Proposed Scheme. 	This option will not be subject to further consideration
Option A	<ul style="list-style-type: none"> • Similar air quality, water resources and flood risk, landscape and visual, historic environment, and ecology impacts compared to the Proposed Scheme. • Less land required for construction compared to the Proposed Scheme. • Longer period over which traffic congestion and delays would occur at M18 junction 1 compared to the Proposed Scheme. • Less opportunity to improve traffic flows and throughput following junction reconfiguration compared to the Proposed Scheme. • Greater technical and engineering complexities compared to the Proposed Scheme. • Longer construction programme compared to the Proposed Scheme. 	This option will not be subject to further consideration

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Option	Outcome of analysis	Further action/considerations
	<ul style="list-style-type: none"> • Greater cost compared to the Proposed Scheme. 	
Option B	<ul style="list-style-type: none"> • Similar air quality, water resources and flood risk, landscape and visual, historic environment, and ecology impacts compared to the Proposed Scheme. • Less land required for construction compared to the Proposed Scheme. • Longer period over which traffic congestion and delays would occur at M18 junction 1 compared to the Proposed Scheme. • Less opportunity to improve traffic flows and throughput following junction reconfiguration compared to the Proposed Scheme. • Greater technical and engineering complexities compared to the Proposed Scheme. • Longer construction programme compared to the Proposed Scheme. • Higher cost compared to the Proposed Scheme. 	This option will not be subject to further consideration
Option C (the Proposed Scheme)	<ul style="list-style-type: none"> • Similar air quality, water resources and flood risk, landscape and visual, historic environment, and ecology impacts compared to alternative options. • Largest area of land required for construction compared to the alternative options. • Shorter period over which traffic congestion and delays would occur at M18 junction 1 compared to alternative options. • Greater opportunity to improve traffic flows and throughput following junction reconfiguration compared to alternative options. • Fewer technical and engineering complexities compared to alternative options. • Shorter construction programme compared to alternative options. • Lower cost compared to the other alternative options. 	This is the selected option taken forward into the Proposed Scheme

2.5.8 Option C was taken forward into the Proposed Scheme. This option required the most land for construction, but would use a simplified construction method, which would require less time and complexity to construct, when compared to the alternative tunnel options. Disruption to vehicles using M18 junction 1 would be less as the permanent extended junction would be constructed as part of the temporary works. Furthermore, the two overbridges would be constructed offline and would be independent structures, so they could be completed in parallel to reduce the construction period. The permanent reconfiguration of the junction would require additional land to be acquired permanently. This would potentially include part of the adjacent hotel car park, which would have the potential to impact on the business operations at that location (car parking). However, an area of grassland adjacent to the hotel was identified at the time of the appraisal as a potential site for future hotel parking. Overall, a simplified construction method, smaller structures and reduced temporary works mean that Option C was seen as the most cost-effective option with the lowest construction risk.

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 6.

Table 6: Mechanisms and timeline of stakeholder engagement since route announcement

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

Draft EIA SMR consultation

- 3.2.2 The 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 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 equality impact assessment (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 Ulley to Bramley 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 Ulley to Bramley 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 construction satellite compounds near Ulley, Brampton en le Morthen and Bramley;
 - refining the location of balancing ponds, including the King's Pond Plantation Local Wildlife Site 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), including the 'Doorstop walk no.18' within Wickersley Wood, and greenways in Rotherham including Bramley Footpath, cycleways and bridleways;
 - temporary or permanent changes to road access with impacts on residents, businesses, emergency services and road users including at B6060 Morthen

Road to ensure access to Thurcroft and farm access is retained, impacts related to the construction of viaducts over the strategic highway at the M1 junction 32;

- congestion on B6060 Morthen Road during construction;
- impacts on access to local community educational/care/sporting/leisure/cultural facilities including Penny Hill wind farm and associated community fund, Wickersley Wood, Nicker Wood, Foers Wood Local Wildlife Site, Norwood Local Wildlife Site, Firsby Reservoir Country Park, Dearne Valley Wildlife Corridor, Pea Carr Wood, allotments at Thurcroft and green space between the Proposed Scheme and the Broadland at Bramley;
- impacts on local businesses including Banks Group Penny Hill Wind Farm;
- the potential visual impacts including those related to the Thurcroft auto-transformer feeder station, viaducts around the M1 junction 32, Bramley cutting (Broadlands Estate), Penny Hill wind farm, King's Pond Plantation and Slacks Farm, Wickersley Wood, Ulley, Allotments and Woodhouse Green;
- construction and operational noise impacts including impacts on the community of Bramley;
- construction traffic impacts from changes to M18 junction 1 to accommodate the Proposed Scheme;
- discussion of engineering options in this area;
- consideration of planning policy allocations, consented schemes and development aspirations;
- the mitigation of construction impacts of the Proposed Scheme including increased HGV movements and on-street car parking by construction workers;
- the potential impact on ecology and biodiversity and opportunities for environmental mitigation; and
- understanding the property schemes available to residents.

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 Ulley to Bramley 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. This included engagement with constituents as part of constituent surgeries hosted by Sir Kevin Barron MP, Bramley Action Group and Banks Group (regarding Penny Hill wind farm and the associated community fund).

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- 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 7 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 7: Engagement to date with community stakeholders

Stakeholder	Area of focus
Sir Kevin Barron MP	Three constituency surgeries hosted by Sir Kevin Barron MP for Rother Valley (for Aston, Bramley and Wales) to provide constituents with information on the Proposed Scheme, provide support and attempt to resolve their issues (including those related to the blight notice procedure, rural support zone procedure and the use of agents). Provided a briefing to Sir Kevin Barron MP on the updated design at Aston, Wales, Bramley and Thurcroft, which included discussion around construction, road realignments, construction compounds and an alternative route.
Sarah Champion MP	Meeting with MP for Rotherham to provide update including parkway and connectivity options.
Bramley Action Group	Meeting to answer any questions posed by Bramley Action Group, including in relation to PRow and the approach to surveys.
Rotherham Local Access Forum (LAF)	Meeting to discuss the Environmental Impact Assessment (and the information required to inform it) and HS2 Ltd policies and standards in terms of access and mitigation and PRow. The meeting was also an opportunity for the local access forum to share their concerns and raise queries.
Penny Hill Wind Farm (Banks Group)	Meeting to discuss impacts on the Penny Hill Wind Farm and options for mitigation.

Local authorities and parish councils

- 3.4.7 Direct engagement has been undertaken with county, borough, district and parish councils within the Ulley to Bramley 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.
- 3.4.8 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.
- 3.4.9 Key issues identified during engagement with local authorities and parish councils include those summarised in Table 8.

Table 8: Engagement to date with local authorities and parish councils

Stakeholder	Area of focus
Rotherham Metropolitan Borough Council	General introductory and project update meetings, including briefings to Council leaders. Discussion on the needs of the local authority, including approach to engagement with stakeholders.
	Meeting with technical leads to collate data and discuss key assessment topics including: air quality; ecology; flood risk; drainage and water; landscape and visual issues; traffic and transport; sound, noise and vibration; utilities; and waste and material resources.
	In addition to the above, particular topics discussed included planned and committed developments and a potential parkway station.
	A meeting with the RMBC Growth Board was held to provide an update on the Proposed Scheme. The potential parkway station and business opportunities were discussed.
	HS2 Ltd attended a meeting with Barnsley and Rotherham Chamber of Commerce to discuss wider parkway station and connectivity options, blight and local business concerns.
Rotherham Parish Councils	Engagement to understand local concerns, to discuss the design processes, and establish a schedule for focused engagement on environmental and engineering issues.
Dinnington St John's Town Council	Engagement to understand local concerns, to discuss the design processes, and establish a schedule for focused engagement on environmental and engineering issues.
	Further discussion included access constraints, notably the M1 and A57 and career opportunities through the National College for High Speed Rail.
Hellaby Parish Council	Engagement to understand local concerns, to discuss the design processes, and establish a schedule for focused engagement on environmental and engineering issues.
	Further discussion included mitigation proposals in relation to concerns about noise and access during construction, as well as identification of existing areas of high traffic volumes.
Ravenfield Parish Council	Engagement to understand local concerns, to discuss the design processes, and establish a schedule for focused engagement on environmental and engineering issues.
	Further discussion included concerns regarding the change of route from Meadowhall, access arrangements, compound locations, existing road conditions and impacts associated with a large residential policy allocation.

- 3.4.10 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)¹⁷.

Expert, technical and specialist groups

- 3.4.11 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;
- Barnsley and Rotherham Chamber of Commerce;
- British Geological Survey;
- Campaign to Protect Rural England;
- Canal & River Trust;
- Clinical Commissioning Groups;
- Coal Authority;
- Department for Environment, Food and Rural Affairs;
- English Heritage;
- Environment Agency;
- Equality and Human Rights Commission;
- Fera Science Limited;
- Forestry Commission;
- Health and Wellbeing Boards and Directors of Public Health;
- Highways England;
- Historic England;
- Homes England;
- Inland Waterways Association;
- Internal drainage boards;
- National Environment Forum;
- National Farmers Union;
- National Trust;
- Natural England;

¹⁷ Supporting document: Draft Code of Construction Practice

- Network Rail;
- Non-governmental Organisation Forum;
- Public Health England;
- The Ramblers;
- Rotherham archives and local studies service;
- Royal Agricultural Society;
- Royal Society for the Protection of Birds;
- Royal Society of Wildlife Trusts/The Wildlife Trusts (Sheffield and Rotherham Wildlife Trust and Yorkshire Wildlife Trust);
- Sheffield and Rotherham Wildlife Trust;
- Sheffield Chamber of Commerce;
- Sheffield City Region Local Enterprise Partnership;
- South Yorkshire Mining Advisory Service;
- The Trans Pennine Trail;
- Utility companies relevant to this area; and
- Woodland Trust

3.4.12 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.

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

Utilities

3.4.14 Engagement is also ongoing with utility companies and statutory stakeholders such as National Grid Transmission (electric), Northern Powergrid, Yorkshire Water, Cadent, BT Openreach, Virgin Media, GeneSys, CityFibre and Zayo to establish what infrastructure exists in the Ulley to Bramley area and how it may need to be modified as part of the Proposed Scheme.

Directly affected individuals, major asset owners and businesses

3.4.15 This group includes those with property potentially affected by the Proposed Scheme, including individuals, major asset owners and businesses within the Ulley to Bramley area.

3.4.16 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

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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.

- 3.4.17 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.
- 3.4.18 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.
- 3.4.19 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 Ulley to Bramley area, an information event was held at Hellaby Hall Hotel on 12 June 2018. Facilities were available at the event for affected individuals, major asset owners and businesses to have private meetings with HS2 staff.
- 3.4.20 Engagement has been undertaken with major asset owners including Highways England, National Grid and Penny Hill wind farm (Banks Group) to discuss the interfaces between the Proposed Scheme and their respective property. This included discussions regarding impacts and risks in relation to future land use, relocation of assets, access constraints, clearance and maintenance requirements, as well as the location of the auto-transformer feeder station.
- 3.4.21 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 Ulley to Bramley 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 Guide¹⁸.
- 4.1.3 Maps showing the location of the key environmental features (Volume 2: LA12 Map Book, Map Series CT-10) and the key construction (Volume 2: LA12 Map Book, Map Series CT-05) and key operational (Volume 2: LA12 Map Book, Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2: Community area LA12, Ulley to Bramley: LA12 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, Introduction and Methodology (Section 8) and the Scope and Methodology Report (SMR)¹⁹.
- 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 the Ulley to Bramley 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)²⁰ system, which classifies agricultural land into five grades from excellent quality Grade 1 land to very poor quality Grade 5 land.

¹⁸ 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>

¹⁹ Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

²⁰ 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*

Grade 3 is subdivided into Subgrades 3a and 3b. The main issue in the assessment of 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 Ulley to Bramley 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 Ulley to Bramley area is provided in Section 10, Land quality and Section 15, Water resources and flood risk.

The underlying geology of the study area is mapped by the British Geological Survey (BGS)²¹. There are no superficial deposits mapped in the Ulley to Bramley area.

- 4.3.3 The bedrock geology in the most southerly part of the Ulley to Bramley area includes interbedded grey mudstones, siltstone and pale grey sandstone of the Pennine Middle Coal Measures Formation. Coal seams are common within this formation. A variant of the formation, dominated by sandstone, is present in elongated strips, aligned roughly north-west to south-east.
- 4.3.4 Between Ulley Beeches and Ravenfield, the bedrock is of the Pennine Upper Coal Measures Formation, which also includes grey mudstone, siltstone and pale grey sandstone. Coal seams are again common.
- 4.3.5 Sandstone outcrops of the Pennine Upper Coal Measures within the study area include the Ackworth, Dalton, Wickersley and Ravenfield Rocks.

Topography and drainage

- 4.3.6 Topography in this study area is characterised by a series of ridges and hilltops, with typically shallow gradients of less than seven degrees, but with some irregular slopes with localised steeper gradients.
- 4.3.7 The highest altitudes within the Ulley to Bramley area are at around 130m above Ordnance Datum (AOD), though the route of the Proposed Scheme would mostly pass across mid-slopes at between 110m and 125m AOD. The lower altitudes in the valley systems are between around 75m and 100m AOD.
- 4.3.8 Drainage in the south-west of the study area is via a shallow valley, which drains to the west into Ulley Brook. To the west of Thurcroft, Morthen Brook has cut a valley into the underlying sandstone and drains to the Ulley Reservoir in the west.
- 4.3.9 Drainage in the south-east of the area, south of Thurcroft, is to the east into Anston Brook. Further north, Kingsford Brook, Newhall Dyke and Hellaby Brook provide drainage between Wickersley and Ravenfield.
- 4.3.10 The Environment Agency's Flood Map for Planning (rivers and sea)²² has been used to scope the baseline flood risk for flooding from main rivers and ordinary watercourses. The land required for the Proposed Scheme is not anticipated to be significantly affected by flooding.

Description and distribution of soil types

- 4.3.11 The broad characteristics of the soils likely to be present in the Ulley to Bramley area are described by the Soil Survey of England and Wales²³ and their general distribution is shown on the National Soil Map²⁴. Soils possessing similar characteristics are amalgamated into associations.

²¹ British Geological Survey (2018) Geology of Britain viewer. Available online at: <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

²² Environment Agency (2018) Flood Map for Planning. Available online at: <https://flood-map-for-planning.service.gov.uk/>

²³ Soil Survey of England and Wales (1984), *Soils and their use in Midland and Western England*, Soil Survey of England and Wales, Bulletin No. 12, Harpenden

²⁴ Cranfield University (2001), *The National Soil Map of England and Wales 1:250,000 scale*. Cranfield University: National Soil Resources Institute

- 4.3.12 There are three known soil associations mapped in this area, each of which has developed in Carboniferous mudstone or sandstone. The presence of Rivington 1 association has been confirmed in part of the Ulley to Bramley area by published soil survey data.
- 4.3.13 The Bardsey and Dale associations represent the most prevalent soils in the study area and comprise imperfectly or poorly drained fine loamy and clayey textures. Bardsey association soils are mapped across a large area from the south-west of Thurcroft to the south-east of Bramley, and also occur north of Bramley. Bardsey soils are characterised by either stoneless clay loam or sandy clay loam topsoils overlying grey clay or silty clay subsoils. In some places where there are very thin weathered sandstone beds, the Bardsey soils can have better drained heavy clay loam and medium sandy clay upper subsoils over clay or silty clay lower subsoils. Soils of the Bardsey association are of Wetness Class²⁵ (WC) III or IV.
- 4.3.14 The Dale association is mapped in a small area to the east and north-east of Bramley, and comprises stoneless clay or clay loam topsoil over grey clay subsoil. Profiles of the Dale association are typically poorly drained, of Wetness Class²⁶ (WC) IV, or potentially V.
- 4.3.15 At the southern end of the Ulley to Bramley area, to the south of Penny Hill Lane, and also to the east and south-east of Bramley, are soils of the Rivington 1 association. Rivington 1 soils develop in outcrops of sandstone within the coal measures. Profiles typically comprise either sandy loam or sandy silt loam topsoils over sandstone or extremely stony sandy loam. Profiles are well drained, of WC I, and may be slightly or moderately droughty depending on soil depth. This soil type was identified in a survey undertaken for the Ministry of Agriculture, Fisheries and Food (MAFF) in 1993 to the south-east of Bramley²⁷.

Soil and land use interactions

Agricultural land quality

- 4.3.16 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.
- 4.3.17 The main soil properties that affect the cropping potential and management requirements of land are texture, structure, depth, stoniness and chemical fertility.
- 4.3.18 Climate within the Ulley to Bramley area does not in itself place any limitation on agricultural land quality. However, the interactions of climate with soil characteristics are important in determining the wetness and droughtiness²⁸ limitations of the land.

²⁵ 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

²⁶ 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

²⁷ ADAS (1993). Agricultural Land Classification, Rotherham Unitary Development Plan, Site H21/47 Sandy Lane, Bramley, Job No 69/93

²⁸ 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

- 4.3.19 The local agro-climatic data have been interpolated from the Meteorological Office's standard 5km grid point dataset²⁹ for two representative points within the Ulley to Bramley area. The data show the area to have a cool or cold climate with moderate rainfall. The number of Field Capacity Days (FCDs)³⁰, when the moisture deficit³¹ is zero, is in the region of 140 days, which is slightly lower than average for lowland England (150 days), and generally favourable for providing opportunities for agricultural cultivations and soil handling. Moisture deficits, which give an indication of the liability of soils to droughtiness in summer, are moderate to moderately large.
- 4.3.20 The main physical limitations which result from interactions between soil, climate and site are soil wetness, soil droughtiness and localised susceptibility to erosion. 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.
- 4.3.21 The main soils in the Bardsey and Dale associations, comprising clay loam, sandy clay loam or clay topsoils over clayey subsoils, are most limited by soil wetness and workability. Poorly drained Bardsey association soils of WC IV with clay loam or sandy clay loam topsoils are limited to Subgrade 3b, as are better drained (WC III) profiles with heavy clay loam topsoils. Bardsey profiles of WC III with medium loamy topsoils are less severely limited, to Subgrade 3a. Poorly drained Dale association soils of WC IV with clay loam or clay topsoil are similarly limited to Subgrade 3b, and those of WC V are limited to ALC Grade 4.
- 4.3.22 Well drained, fine-or-coarse loamy soils of the Rivington 1 association are most likely to be affected by soil droughtiness, the severity of which is determined by factors set out above. As moisture deficits are moderate to moderately large, droughtiness limitations are mostly slight to moderate, to Grade 2 or Subgrade 3a, though Subgrade 3b may be present where the soils are shallow over bedrock.
- 4.3.23 Published survey data for land to the south-east of Bramley confirms Rivington 1 soils as Grades 2, 3a and 3b. Rivington 1 soils comprising profiles of very slightly stony medium sandy loam throughout, or which occasionally pass to medium sand at depth, are affected slightly by droughtiness and are limited to Grade 2.
- 4.3.24 Rivington 1 soils classified as Subgrade 3a are affected more severely by droughtiness, due to coarser, loamy medium sand topsoil and similar or medium sand subsoil. Where sandstone bedrock is present within around 80cm depth, restricting the total profile depth, the limitation is more severe, to Subgrade 3b.

²⁹ Meteorological Office (1989), *Gridpoint Meteorological data for Agricultural Land Classification of England and Wales and other Climatological Investigations*

³⁰ 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

³¹ 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

- 4.3.25 As set out in the SMR, the sensitivity of BMV land in the Ulley to Bramley 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 mapping³² shows that there is a low likelihood of encountering BMV agricultural land in the locality, which makes such land a resource of high sensitivity in this study area. This is because the BMV land is associated with sandstone outcrops and Rivington 1 soils, both of which are considerably less extensive than the Coal Measures shales, and the heavier textured soils associated with them.
- 4.3.26 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

- 4.3.27 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 England³³ and the Government's White Paper, *The Natural Choice: securing the value of nature*³⁴, and include:
- the storage, filtration and transformation of water, carbon and nitrogen in the biosphere;
 - 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.
- 4.3.28 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.
- 4.3.29 The Morthen Brook and Kingsforth Brook each drain westward to the Swallow Mills Pond and King's Pond Plantation 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 the Ulley to Bramley area function as water stores for flood attenuation, as well as providing ecological habitat.

³² Defra (2005), *Likelihood of Best and Most Versatile Agricultural Land*

³³ Defra (2009), *Soil Strategy for England*

³⁴ HM Government (2011), *The Natural Choice: securing the value of nature*

Land use

Land use description

- 4.3.30 Land in the Ulley to Bramley area is primarily in arable cultivation, with the majority of the fields being medium to large in scale. There are some smaller fields in pasture west of Brampton-en-le-Morthen, between Thurcroft and Wickersley, and north of Bramley, which reflect the livestock and equestrian use of the land.
- 4.3.31 Woodland in the Ulley to Bramley area is limited, being primarily restricted to the gap between Thurcroft and Wickersley. With the exception of Wickersley Wood, woodland comprises small blocks of trees including Pea Carr Wood, which is an ancient woodland, and Moat Wood and Slack Farm Wood, which are both broadleaved woodlands. None of the woodlands within the study area appear to be managed commercially.
- 4.3.32 A number of environmental designations influence land use within the Ulley to Bramley 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.
- 4.3.33 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.
- 4.3.34 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. Holdings that have land entered into an agri-environment scheme are identified in Table 9.

Number, type and size of holdings

- 4.3.35 Table 9 sets out the current understanding of main farm holdings within the Ulley to Bramley 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.

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4.3.36 Table 9 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 9: Summary of characteristics of holdings

Holding name	Holding type	Holding size (ha)	Diversification	Agri-environment scheme	Sensitivity to change
Ulley Hall Farm*	Arable	181	Not Known	ELS and HLS	Medium
Townend Farm*	Dairy (distant from grazing block)	109	Not Known	None	Medium
Manor Farm/ Grange Farm*	Arable and beef cattle	279	Not Known	ELS and HLS	Medium
Land north of Brampton Lane*	Equestrian (non-commercial)	2	Not Known	None	Low
Land farmed by J D F Farms*	Arable	51	Not Known	ELS	Medium
Land west of Pea Carr Wood*	Grassland	7	Not Known	None	Medium
Hall Farm	Arable	283	Horse livery	None	Medium
Millstone Farm*	Arable and grassland	75	Not Known	None	Medium
Land west of Kingsforth Lane*	Equestrian (non-commercial)	>1	Not Known	None	Low
Land north-east of B6060/B6410 junction*	Grassland	4	Not Known	None	Low
Honeysuckle Cottage	Grassland	3	None	None	Low
Low Farm*	Arable	37	Not Known	None	Medium
Land off A631 Bawtry Road*	Grassland	4	Not Known	None	Medium
Church Farm*	Arable	47	Not Known	None	Medium
Spewood Farm/ New House Farm*	Beef	25	Not Known	None	Medium
Land south of Lidget Lane*	Equestrian (commercial)	5	Not Known	None	Medium

Holding name	Holding type	Holding size (ha)	Diversification	Agri-environment scheme	Sensitivity to change
Land north of Lidget Lane*	Arable	6	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)³⁵ 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 of the CoCP);
- the provision of a method statement within the farm pack for stripping, handling, storing and replacing agricultural and woodland soils to reduce risks associated with soil degradation on areas of land to be returned to agriculture and woodland following construction, based on detailed soil survey work to be undertaken prior to construction. This would include any remediation measures necessary following the completion of works. Where they occur, there will be special provisions for handling peat and peaty soils (Section 6);
- a requirement for contractors to monitor and manage flood risk and other extreme weather events, insofar as reasonably practicable, that may affect agriculture, forestry and soil resources during construction (Sections 5 and 16);
- arrangements for the maintenance of farm and field accesses affected by construction (Section 6);
- the protection and maintenance of existing land drainage and livestock water supply systems, where reasonably practicable (Sections 6 and 16);
- the protection of agricultural land adjacent to the construction site, including the provision and maintenance of appropriate stock-proof fencing (Sections 5,

³⁵ Supporting document: Draft Code of Construction Practice

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, the following measures have been incorporated at this stage to avoid or mitigate adverse impacts on agriculture, forestry or soils:

- Carr Lane underbridge to mitigate severance of agricultural land at Town End Farm (CT-06-461); and
- Wickersley Footpath 9 accommodation overbridge to mitigate severance of Millstone Farm (CT-06-463).

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

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

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

Assessment of impacts and effects

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

effective for agricultural use due to their size and/or shape as part of environmental mitigation works, such as ecological habitat creation.

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

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

Temporary effects during construction

Impacts on agricultural land

4.4.9 Interpretation of publicly available data shows that Proposed Scheme is likely to require approximately 165ha of agricultural land within the Ulley to Bramley area during the construction phase, of which approximately 32ha (19%) are likely to be classified as BMV land (Grade 3a). This would be a low magnitude of impact on BMV land.

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

4.4.11 Following completion of construction, temporary facilities would be removed and the topsoil and subsoil reinstated in accordance with the agreed end use for the land. Some permanently displaced soils may be used to restore land to agriculture or other uses with slightly deeper topsoil and subsoil layers, where appropriate. This could improve the quality of agricultural land locally, for example where droughty soils are limited by soil depth, subject to the soil resource plans to be prepared during the detailed design stage.

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 Soils³⁶. These principles would be followed throughout the construction period.

- 4.4.14 Clayey and seasonally waterlogged soils of the Bardsey and Dale associations would be least able to remain structurally stable if moved in wet conditions or by inappropriate equipment. They are susceptible to compaction and smearing, which could affect successful reinstatement.
- 4.4.15 Implementation of the measures set out in the draft CoCP would reduce the magnitude of impact on soil. The detailed soil survey data will define the sensitivity of soil, and the assessment of the effects on soils to be disturbed will be reported in the formal ES.

Impacts on holdings

- 4.4.16 Land may be required for the Proposed Scheme from holdings temporarily, during the construction period, or permanently. In most cases, the temporary and permanent land requirement would occur simultaneously at the start of the construction period and it is the combined effect of both that would have the most impact on the holding. During the construction period, some agricultural land would be restored and the impact on individual holdings would reduce.
- 4.4.17 The effects of the Proposed Scheme on individual agricultural and related interests during the construction period will be reported in the formal ES. The formal ES will present the total area of land required on a particular holding during the construction period in absolute terms and as a percentage of the total area farmed. It will also show the area of land that would be returned to the holding following the construction period. These effects and 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 10 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.

³⁶ Defra (2009), *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites*

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Table 10: Summary of temporary effects on holdings from construction

Holding name/ Sensitivity to change	Land potentially required	Potential severance impact	Potential scale of effect
Ulley Hall Farm Medium sensitivity	Negligible	Negligible	Negligible
Townend Farm Medium sensitivity	High	High	Major/moderate adverse
Manor Farm/Grange Farm Medium sensitivity	Negligible	Negligible	Negligible
Land north of Brampton Lane Low sensitivity	High	Negligible	Moderate adverse
Land farmed by J D F Farms Medium sensitivity	High	Negligible	Major/moderate adverse
Land west of Pea Carr Wood Medium sensitivity	Low	Negligible	Minor adverse
Hall Farm Medium sensitivity	Low	Negligible	Minor adverse
Millstone Farm Medium sensitivity	High	Medium	Major/moderate adverse
Land west of Kingsforth Lane Low sensitivity	High	Negligible	Moderate adverse
Land north-east of B6060/B6410 junction Low sensitivity	High	High	Moderate adverse
Honeysuckle Cottage Low sensitivity	High	Negligible	Moderate adverse
Low Farm Medium sensitivity	High	Negligible	Major/moderate adverse
Land off A631 Bawtry Road Medium sensitivity	High	Negligible	Major/moderate adverse
Church Farm Medium sensitivity	High	Negligible	Major/moderate adverse
Spewood Farm/New House Farm Medium sensitivity	Medium	Negligible	Moderate adverse

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Holding name/ Sensitivity to change	Land potentially required	Potential severance impact	Potential scale of effect
Land south of Lidget Lane Medium sensitivity	High	Negligible	Major/moderate adverse
Land north of Lidget Lane Medium sensitivity	High	Negligible	Major/moderate adverse

4.4.20 Overall, the construction of the Proposed Scheme could potentially affect 17 agricultural holdings in the Ulley to Bramley area temporarily. On the basis of information currently available, 13 holdings could experience moderate or major/moderate adverse effects during construction, which would be significant for each holding.

4.4.21 Eight farm holdings are anticipated to experience major/moderate adverse temporary effects, largely due to the proportion of land required for construction of the Proposed Scheme. Five holdings are anticipated to experience moderate adverse effects, mostly due to the proportion of land required from small holdings.

4.4.22 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

4.4.23 Interpretation of publicly available data shows that the Proposed Scheme is likely to require approximately 98ha of agricultural land permanently within the Ulley to Bramley area, of which approximately 12ha (12%) are likely to be classified as BMV land (Grades 2 and 3a). This would be a low magnitude of impact on BMV land.

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

Impacts on forestry land

4.4.25 It is currently anticipated that an area of less than 1ha at Slack Farm Wood would be lost as a result of the Proposed Scheme. It is not known whether this woodland is managed commercially. 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

4.4.26 The potential permanent effects from the construction of the Proposed Scheme on individual agricultural and related interests are summarised in Table 11 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

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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.

4.4.27 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 11: 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
Ulley Hall Farm Medium sensitivity	Negligible	Negligible	Negligible	Negligible
Townend Farm Medium sensitivity	High	Negligible	Negligible	Major/moderate adverse
Manor Farm/Grange Farm Medium sensitivity	Negligible	Negligible	Negligible	Negligible
Land north of Brampton Lane Low sensitivity	High	Negligible	Negligible	Moderate adverse
Land farmed by J D F Farms Medium sensitivity	Medium	Negligible	Negligible	Moderate adverse
Hall Farm Medium sensitivity	Negligible	Negligible	Negligible	Negligible
Millstone Farm Medium sensitivity	Medium	Medium	Negligible	Moderate adverse
Land west of Kingsforth Lane Low sensitivity	Negligible	Negligible	High	Moderate adverse
Land north-east of B6060/B6410 junction Low sensitivity	High	Negligible	Negligible	Moderate adverse
Honeysuckle Cottage Low sensitivity	High	Negligible	Negligible	Moderate adverse
Low Farm Medium sensitivity	High	Negligible	Negligible	Major/moderate adverse
Church Farm Medium sensitivity	High	Negligible	Negligible	Major/moderate adverse
Land south of Lidget Lane	Medium	Negligible	High	Major/moderate adverse

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Holding name/ Sensitivity to change	Land potentially required	Potential severance impact	Potential impact on farm infrastructure	Potential scale of effect
Medium sensitivity				
Land north of Lidget Lane Medium sensitivity	High	Negligible	Negligible	Major/moderate adverse

4.4.28 Overall, the construction of the Proposed Scheme could potentially affect 14 holdings in the Ulley to Bramley area permanently. On the basis of information currently available, 11 holdings could experience moderate or major/moderate adverse permanent effects from construction, which would be significant for each holding. Three holdings at land west of Pea Carr Wood, land off A631 Bawtry Road and Spenwood Farm/New House Farm would not experience any permanent effects.

4.4.29 Five farm holdings are anticipated to experience major/moderate adverse permanent effects, largely due to the proportion of land required for the Proposed Scheme. Six holdings are anticipated to experience moderate permanent adverse effects from construction, which would be due to medium land required impacts on medium sensitivity holdings, or a high proportion of land required from low sensitivity holdings.

4.4.30 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

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

4.4.32 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.

4.4.33 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

4.4.34 Although the extent of land required permanently by ALC grade is not yet known in the Ulley to Bramley area, current indications based on publicly available information are that the effect on BMV agricultural land would be moderate adverse temporarily

during construction, which would be significant, and moderate adverse permanently from construction, which would be significant. The amount of land required by ALC grade will be assessed and reported in the formal ES.

4.4.35 Thirteen of the 17 farm holdings identified are anticipated to experience moderate or major/moderate temporary effects during construction; with 11 anticipated to experience moderate or major/moderate adverse permanent effects, which would be significant for each holding.

4.4.36 Effects on forestry land and soils to be disturbed will be 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 No farm buildings have been identified within approximately 100m of the route of the Proposed Scheme. The potential significant effects on sensitive housed livestock receptors from noise will be assessed and reported in the formal ES.

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

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

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

Other mitigation measures

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

Summary of likely residual significant effects

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

Monitoring

- 4.5.8 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme.
- 4.5.9 There are no area-specific requirements identified for monitoring agriculture, forestry and soil during the operation of the Proposed Scheme in the Ulley to Bramley 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 Ulley to Bramley area. Oxides of nitrogen (NO_x) including nitrogen dioxide (NO₂), fine particulate matter³⁷ (PM₁₀, 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 Rotherham Metropolitan Borough Council (RMBC) 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 are provided in the Volume 2: LA12 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, Introduction and Methodology, Section 8, and the Scope and Methodology Report (SMR)³⁸.
- 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 occur³⁹:
- from construction activities;
 - 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.

³⁷ PM_{2.5} and PM₁₀ describe two size fractions of airborne particles that can be inhaled and therefore are of concern for human health. The designations refer to particles of size less than 2.5 and 10 microns in diameter

³⁸ Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

³⁹ 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 year 2023. As both pollutant emissions from vehicle exhausts and background pollutant concentrations are anticipated to reduce year by year as a result of vehicle emission controls, the year 2023 represents the worst case for the construction assessment.

5.3 Environmental baseline

Existing baseline

Background air quality

- 5.3.1 The main sources of air pollution in the Ulley to Bramley area are emissions from road vehicles and agricultural activities. The main roads within the area are the M1, the M18, the A361 Bawtry Road, the B6060 Morthen Road/Woodhouse Green/Green Arbour Road and the B6410 Morthen Lane.
- 5.3.2 There are no industrial installations (regulated by the Environment Agency) with permits for emissions to air within the Ulley to Bramley area. 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)⁴⁰ for the baseline year of 2017. The data are estimated for 1km grid squares for NO_x, NO₂, PM₁₀ and PM_{2.5}. Background concentrations are within the air quality standards for all pollutants within the Ulley to Bramley area.

Local monitoring data

- 5.3.4 There are currently three local authority diffusion tube sites located within the Ulley to Bramley area for monitoring NO₂ concentrations. These are all in the town of Bramley. Measured concentrations in 2016 were within the air quality standard⁴¹.

Air quality management areas

- 5.3.5 There are no air quality management areas (AQMA) within the Ulley to Bramley area.

Receptors

- 5.3.6 Several locations have been identified within the Ulley to Bramley 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.

⁴⁰ Department for Environment, Food and Rural Affairs (Defra), Defra Background Pollutant Concentration Maps; <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015>

⁴¹ At the time of assessment, measurements for 2016 were the latest published annual monitoring baseline data

5.3.7 Most of the receptors identified that may be affected by the Proposed Scheme are residential, in areas including Thurcroft, Wickersley and Bramley. Other receptors include a number of schools, children's nurseries, and businesses.

5.3.8 There are no statutory designated ecological sites within the Ulley to Bramley area. Non-statutory sensitive ecological sites identified close to the Proposed Scheme include Pea Carr Wood ancient woodland, King's Pond Plantation Local Wildlife Site (LWS), Brampton Common LWS and Wickersley Wood 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)⁴². The draft CoCP includes a range of mitigation measures that are accepted by the Institute of Air Quality Management (IAQM) as being suitable to reduce impacts to as low a level as is reasonably practicable. These measures are generally sufficient to avoid any significant effects from dust during construction.

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

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

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

⁴² Supporting documents: Draft Code of Construction Practice

Assessment of impacts and effects

Temporary effects

- 5.4.4 Impacts from construction of the Proposed Scheme could arise from dust-generating activities and emissions from construction traffic. As such, the assessment of construction impacts has been undertaken for dust and exposure to NO₂, PM₁₀ and PM_{2.5} concentrations.

Construction dust effects

- 5.4.5 The risks of demolition of existing buildings, earthworks, construction of new structures and trackout⁴³, have been assessed for their effect on dust soiling, human health⁴⁴ and ecological sites. There are residential and ecological receptors located within the Ulley to Bramley area.
- 5.4.6 It has been identified that there would be a low risk of dust effects and negligible risk of human health effects from demolition. For earthworks, there would be a medium to high risk of dust effects and a medium risk of human health effects. For construction, the risk of dust effects would range from low to high within this area, depending on the location of sensitive receptors and the magnitude of the construction activities. There would also be a low to medium risk of human health effects. For trackout, there would be a high risk of dust effects and a medium risk of human health effects. There would also be a low risk of ecological effects from all dust generating activities. No demolition activities would affect any ecological receptors.
- 5.4.7 With the application of the established national best practice mitigation measures contained in the draft CoCP, no significant effects are anticipated from dust generating activities.

Construction traffic effects

- 5.4.8 Construction activity could also affect local air quality through the additional traffic generated on local roads as a result of construction vehicles and through changes to traffic patterns arising from temporary road diversions and realignments.
- 5.4.9 The M1, the M18, the A631 Bawtry Road, the B6060 Morthen Road/Woodhouse Green/Green Arbour Road, the B6410 Morthen Lane, Long Road, Penny Hill Lane, Brampton Lane, Katherine Road, Brampton Road, Woodhouse Green, Kingsforth Lane, Cumwell Lane, Sandy Lane, Flash Lane, Denaby Way, Hellaby Lane, Lidget Lane, Bramley Lane and Common Lane would likely provide the primary access for construction vehicles in this area. An increase in traffic flows as a result of construction traffic, temporary closures or diversions is anticipated on these roads. 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 sensitive receptors and

⁴³ 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

⁴⁴ Human health effects relate mainly to short-term exposure to particles of size between 2.5µm to 10µm, measured as PM₁₀

ecological habitats considered to be sensitive to changes in local air quality. The effects will be reported in the formal ES.

Permanent effects

- 5.4.11 No permanent effects on local air quality 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 during operation of the Proposed Scheme.

Assessment of impacts and effects

- 5.5.2 Impacts from the operation of the Proposed Scheme would arise from changes in the volume, composition and/or speed of road traffic, and changes in road alignment.
- 5.5.3 There would be no direct atmospheric emissions from the operation of trains that would cause an impact on air quality, and therefore no further assessment is required. Indirect emissions from sources such as rail wear and brakes have been assumed to be negligible.

Operational traffic effects

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

Other mitigation measures

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

Summary of likely residual significant effects

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

Monitoring

- 5.5.7 Volume 1, Section 9, sets out the general approach to environmental monitoring during operation of the Proposed Scheme.
- 5.5.8 Any specific requirements for monitoring air quality effects during operation of the Proposed Scheme in the Ulley to Bramley 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 Ulley to Bramley area.
- 6.1.2 The assessment draws on information gathered from engagement with the users and operators of community facilities including Banks Group, Hellaby Parish Council, Ravenfield Parish Council and Bramley Parish Council. The purpose of this engagement has been to understand how facilities are used and to obtain relevant baseline information to inform the design development and assessment 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: LA12 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)⁴⁵.
- 6.2.2 The assessment of in-combination effects would 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 the relatively early stage of design of the Proposed Scheme. Where this is the case they will be reported in the formal ES.

⁴⁵ Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

- 6.2.5 If a temporary or permanent alternative route cannot be provided in advance of any road or PRow closure, then this will be discussed with the relevant local authority and local groups and reported in the formal ES.
- 6.2.6 The assessment in the working draft ES is based on the design information, including demolitions as set out in Section 2 available at the time of the assessment. This is subject to change as a result of design changes confirmed in advance of the submission of the hybrid Bill.
- 6.2.7 The construction of the Proposed Scheme could lead to isolation effects in one or more communities in this area. These will be assessed in the formal ES
- 6.2.8 Overall, the study area is taken as the area of land that encompasses the likely significant effects of the Proposed Scheme. The study area includes the area of land required both temporary 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 take account of catchment areas for community facilities that could be affected where intersected by the Proposed Scheme.
- 6.2.9 For the working draft ES, the full details of the construction traffic routes and geographical scope of likely in-combination (amenity) effects are yet to be determined. In the formal ES, the study area and associated baseline of community resources will be updated to take account of these.

6.3 Environmental baseline

- 6.3.1 The Proposed Scheme through the Ulley to Bramley area would be approximately 7.7km in length and lie within the Rotherham Metropolitan Borough Council (RMBC) area. It would extend from Ulley and Penny Hill, to the south-west of Thurcroft in the south, and travel northwards past Brampton-en-le-Morthen, Morthen and Hellaby towards Bramley and Ravenfield.
- 6.3.2 The area is predominantly rural, made up of a few small settlements on either side of the M18. In general, the majority of community facilities are located in the larger settlements of Rotherham, Thurcroft and Bramley. Brampton-en-le-Morthen, Morthen and Hellaby are hamlets and a village that are predominantly residential in nature, although some provide a small number of local services. Outside of the main settlements the area is characterised by small clusters of dwellings and individual dwellings within rural areas close to the Proposed Scheme.

Brampton-en-le-Morthen, Morthen and surrounds

- 6.3.3 The village of Brampton-en-le-Morthen is located approximately 550m south-west of Thurcroft, east of Junction 32 on the M1. The village comprises approximately 35 residential properties. The nearest residential properties would be located approximately 190m east of the route of the Proposed Scheme. There are no community resources within the village itself, however located approximately 1.1km

south of Brampton-en-le-Morthen, there is a kart racing track known as Brampton Raceway. To the west of Penny Hill Wind Farm, the village of Ulley would be located approximately 1.4km west of the route of the Proposed Scheme and falls outside the study area.

- 6.3.4 The hamlet of Morthen is located approximately 5.7km south-east of Rotherham and comprises approximately 20 residential properties. The nearest residential properties would be located approximately 850m west of the route of the Proposed Scheme.

Thurcroft and Bramley

- 6.3.5 The village of Thurcroft is located approximately 7.6km south-east of Rotherham. The village comprises approximately 3,050 residential properties and the nearest properties would be located approximately 150m east of the route of the Proposed Scheme. There is a pre-school, an infant school and secondary school. Other community facilities include a dentist, GP surgery, community library, village hall, community hall, recreational ground, a working men's club, nursing home, a place of worship and a range of eating and drinking establishments.
- 6.3.6 Brampton Road allotments are located off Brampton Road to the west of Thurcroft and east of the M18. Access is via a gated single lane track that winds through the allotment and there is a turning circle at the end of the lane. The site is approximately 1.1ha in area and comprises approximately 35 individual plots.
- 6.3.7 There is a small cluster of business units located along Woodhouse Green, to the north-west of Thurcroft. The City Music School is located within one of the units known as Frost House and comprises five studios offering music lessons to the community.
- 6.3.8 The village of Bramley is located approximately 6.5km to the east of Rotherham. The village comprises approximately 8,000 residential properties, and the nearest properties would be approximately 90m from the route of the Proposed Scheme. The A631 Bawtry Road runs through the centre of the village. There are infant, primary and junior schools, youth centre, village hall, scouts group, a place of worship, health centre and a range of eating and drinking establishments. Bramley is bordered on its western side by Sunnyside to the north which is adjacent to the village of Wickersley.
- 6.3.9 Wickersley Wood is located off Morthen Road, south of Bramley and provides routes for walkers as promoted by RMBC. Wickersley Wood is on a long-term lease to Wickersley Parish Council from a private landowner. Wickersley Parish Council helps maintain the Wood.
- 6.3.10 The Sir Jack Pub and Carvery on Moorhead Way, serves food and drink and provides a beer garden plus indoor and outdoor play facilities. There is a dedicated outdoor space area with ten picnic tables and also an outdoor playground to the east of the building. The Sir Jack Pub and Carvery organises monthly events throughout the year for the community.

Hellaby

- 6.3.11 The village of Hellaby is located approximately 8km to the east of Rotherham where the nearest residential properties would be approximately 285m from the route of the

Proposed Scheme. There are approximately 250 residential properties forming a continuous urban area eastwards with Maltby. The northern boundary of Hellaby is dominated by Hellaby Industrial Estate. Junction 1 of the M18 separates Hellaby from Bramley and the rest of Rotherham. There are no community resources within the village. North of Hellaby, where Moor Lane becomes Common Lane and crosses the M18, the road is identified as a promoted PRoW known as Rotherham Ring Route.

6.4 Effects arising during construction

Avoidance and mitigation measures

6.4.1 The draft Code of Construction Practice (CoCP)⁴⁶ 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 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 As part of the construction of the Proposed Scheme, it would be necessary to carry out minor utility works or minor highways works within land that falls within the boundaries of residential properties. The scale of impact will be small, and the duration short (up to three months), resulting in minor adverse effects, which are not significant at a community level.

⁴⁶ Supporting document: Draft Code of Construction Practice

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.

Recreational facilities

- 6.4.4 The construction of the proposed B6060 Morthen Road overbridge would require land for nine months from the access of Frost House, located within the small cluster of business units along Woodhouse Green. City Music School is located in Frost House. There is an alternative vehicular access to Frost House, allowing access to be maintained throughout construction. The temporary loss of this access would result in a minor adverse effect which would not be significant.

Open space and PRow

- 6.4.5 Land required for the construction of the proposed Common Lane overbridge would result in severance of a promoted PRow, the Rotherham Ring Route. Proposed mitigation and an assessment of the likely effects will be reported in the formal ES.

Permanent effects

Residential properties

- 6.4.6 The construction of Lidget Lane overbridge, which would take nine months to complete, would require land from a residential dwelling at Hellaby Park Farm. The access road to this property would be reconfigured to align with the proposed Lidget Lane overbridge so that access would be maintained for residents. The loss of this area of outside space would not impact on the ability of the residents to use their dwellings and access will be modified. This is not considered to have a significant community effect.
- 6.4.7 The construction of Sandy Lane overbridge, which would take nine months to complete, would require land for an embankment resulting in the loss of a pond and approximately 50% of the rear garden at Slacks Farm, Slacks Lane Bramley. The loss of outside space would not impact on the ability of the residents to use their dwelling and access would be maintained throughout construction. This would result in a minor adverse effect, which would not be significant.

Community facilities

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

Recreational facilities

- 6.4.9 Construction works associated with the A631 Hellaby Roundabout North overbridge and Hellaby Roundabout South overbridge, and associated works to the M18 northbound slip roads would require an area of land from the outdoor seating area of Sir Jack Pub and Carvery located on Moorhead Way, Bramley. The works in this area would operate for a period of approximately one year. The pub would be able to function and access would be maintained throughout construction. This would result in a minor adverse effect which would not be significant.

Open space and recreational PRow

- 6.4.10 Construction works associated with the Springvale embankment and B6060 Morthen Road overbridge would require an area of land from the allotments located off Brampton Road, Thurcroft. As a result, approximately 50% of the allotments would be permanently lost. In addition, the construction of the proposed B6060 Morthen Road overbridge would require the access road to the allotments to be permanently closed. It is assumed that the loss of access to this open space would mean that it would not be able to be used for its existing use. The permanent loss of these allotments would result in a major adverse effect which would be significant.

Other mitigation measures

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

Summary of likely residual significant effects

- 6.4.13 Land required for the construction of the Proposed Scheme is likely to result in a permanent residual significant adverse effect to the allotments located off Brampton Road in Thurcroft.

Cumulative effects

- 6.4.14 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.
- 6.4.15 No cumulative effects have been identified at this time. Any combined effects on a community during construction of the Proposed Scheme, which would result in cumulative community effects, will be reported in the formal ES.

6.5 Effects arising from operation

Avoidance and mitigation measures

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

Assessment of impacts and effects

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

Other mitigation measures

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

Summary of likely residual significant effects

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

Cumulative effects

- 6.5.5 Community wide effects occur where a number of individual impacts on resources come together within a location and have a wider impact on the community, such that they change the experience of a considerable proportion of people within that community.
- 6.5.6 No cumulative effects have been identified at this time. Any combined effects on a community during operation of the Proposed Scheme, which would result in cumulative community effects, will be reported in the formal ES.

Monitoring

- 6.5.7 Volume 1, Section 9, sets out the general approach to environmental monitoring during operation of the Proposed Scheme.
- 6.5.8 There are no area-specific community monitoring requirements during operation of the Proposed Scheme. Any area-specific operational monitoring requirements in relation to air quality effects, noise and vibration effects, traffic effects and visual effects that would contribute to the in-combination assessments, will be described in the relevant topic sections of the formal ES.

7 Ecology and biodiversity

7.1 Introduction

- 7.1.1 This section of the report identifies the predicted impacts and likely significant effects on species and habitats identified to date in the Ulley to Bramley area as a consequence of the construction and operation of the Proposed Scheme. This includes effects on sites recognised or designated on the basis of their importance for nature conservation.
- 7.1.2 Engagement with stakeholders including Natural England, Forestry Commission, Rotherham Metropolitan Borough Council (RMBC), Yorkshire Wildlife Trust and Sheffield and Rotherham 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: LA12 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)⁴⁷.
- 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 within LA12 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.

⁴⁷Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

- 7.3.2 Land required for and adjacent to the route of the Proposed Scheme in the Ulley to Bramley area consists mainly of agricultural land, small patches of woodland, villages and farmsteads. The topography is undulating throughout and the route of the Proposed Scheme runs parallel to the M18 for much of its length.
- 7.3.3 Statutory and non-statutory designated sites are shown on Map Series CT-10, Volume 2: LA12 Map Book.

Designated sites

- 7.3.4 There are no statutory designated sites of international or national importance that are relevant to the assessment of the Proposed Scheme in the Ulley to Bramley area.
- 7.3.5 There are three local wildlife sites (LWS) of potential relevance to the assessment in the Ulley to Bramley area, each of which is considered to be of county/metropolitan value. Citations provided by relevant organisations have been used in the descriptions below, and where citations are outstanding, publicly available sources of information have been used. Details of site interest features and reasons for designation will be updated in the formal ES. The LWS are:
- Brampton Common LWS, covering an area of 14.5ha. It is partly within the Staveley to Aston (LA11) area, as well as the Ulley to Bramley area. The LWS is predominantly comprised of mixed arable and pastoral farmland, and is designated primarily for its ornithological interest (farmland birds). It is 149m south-east of the land required for the Proposed Scheme;
 - King's Pond Plantation LWS, covering an area of 5ha, is designated primarily as an area of mixed woodland which surrounds a large fishing pond and lies partly within the land required for the Proposed Scheme; and
 - Wickersley Wood LWS, covering an area of 14ha, is designated primarily for broadleaved woodland. It is 400m south-west of the land required for the Proposed Scheme.
- 7.3.6 There is one Ancient Woodland Inventory Site (AWIS) of potential relevance to the assessment in the Ulley to Bramley area; Pea Carr Wood covers an area of 1.7ha and is located 10m from the land required for the Proposed Scheme. This site is considered to be of up to county/metropolitan value.
- 7.3.7 A review is being undertaken to identify any additional woodlands that are not currently listed on the AWI but that may nevertheless be ancient. These will be identified and assessed in the formal ES.

Habitats

- 7.3.8 The following habitat types occur in this area and are relevant to this assessment.

Woodland

- 7.3.9 In addition to the woodlands within designated sites, there are three other areas of lowland deciduous woodland likely to qualify as habitats of principal importance and local Biodiversity Action Plan (BAP2) habitats, which are within or partly within the land that would be required for the Proposed Scheme. These woodland areas are:

- Moat Wood;
- woodland areas within the M1 junction 32; and
- woodland areas adjacent to the M18.

On a precautionary basis, pending the findings of field surveys, Moat Wood and woodland within the M1 junction 32 are of up to county/metropolitan value. Woodland adjacent to the M18 is likely to be motorway screen-planting and is considered up to district/borough value.

Grassland

- 7.3.10 Grasslands outside designated sites occur within the land that would be required for the Proposed Scheme. These include an area of marshy grassland north-east of Bramley; and an area west of the M18. On a precautionary basis these may qualify as a habitat of principal importance and local BAP habitat. Unless the field surveys identify some of these to be unimproved grasslands, these grasslands are considered to be of up to district/borough value.

Hedgerows

- 7.3.11 Many of the hedgerows in the Ulley to Bramley area are likely to qualify as a habitat of principal importance and as a local BAP habitat. Some may also meet the wildlife and landscape criteria to be important hedgerows as defined in the Hedgerows Regulations 1997⁴⁸. In addition, these hedgerows could also provide commuting corridors for wildlife, as well as nesting and feeding habitat. On a precautionary basis, pending the findings of field surveys, the hedgerow network is considered to be of up to district/borough value.

Watercourses

- 7.3.12 Morthen Brook, Kingsforth Brook, Hellaby Brook, Pinch Mill Brook and several smaller unnamed watercourses lie within land required for the Proposed Scheme. On a precautionary basis, pending the findings of field surveys, these watercourses are considered to be of up to district/borough value.

Water bodies

- 7.3.13 There are seven ponds located within, or partly within, the land required for the Proposed Scheme. Field surveys recorded great crested newt in one pond located on farmland within the M1 junction 32. This pond qualifies as habitat of principal importance, or local BAP habitat, as it is habitat for a fauna species of high conservation importance and is considered to be of county/metropolitan value. Four ponds have been confirmed by field surveys to be unsuitable for great crested newts and, on a precautionary basis, pending the completion of field surveys, the remaining two ponds have been assumed to be of up to county/metropolitan value.

⁴⁸ The Hedgerows Regulations (1997). SI1997 No 1160. Her Majesty's Stationery Office

Ancient and veteran trees

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

Protected and notable species

- 7.3.15 A summary of the likely value of fauna species of relevance to the assessment (excluding any features of species interest for which the sites described above are designated) is provide in Table 12.

Table 12: Species potentially relevant to the assessment within the Ulley to Bramley area

Resource/feature	Value	Rationale
Bats	Up to regional	Bat species present or possibly present in the area are: Daubenton's bat; Brandt's bat; whiskered bat; Natterer's bat; common pipistrelle bat; soprano pipistrelle bat; noctule bat; Leisler's bat; and brown long-eared bat. There is suitable habitat for both roosting and foraging bats within the land required for the Proposed Scheme The woodland, hedgerows and arable fields are likely to be used by a range of bat species for foraging and commuting. Trees and buildings have been identified with potential to support roosting at numerous locations within 100m of the land required for the Proposed Scheme.
Otter	Up to county/metropolitan	Habitat suitable for otter is present along Morthen Brook, Kingsforth Brook, Hellaby Brook, Pinch Mill Brook smaller watercourses and drainage ditches. No third party records of otter have been identified within the Ulley to Bramley area.
Water vole	Up to county/metropolitan	Habitat suitable for water vole is present along Morthen Brook, Kingsforth Brook, Hellaby Brook, Pinch Mill Brook smaller watercourses and drainage ditches. No desk-top records of water vole have been identified within the Ulley to Bramley area.
Great crested newt	Up to county/metropolitan	Field surveys recorded great crested newt in one pond located on farmland within the M1 junction 32. Habitat suitability assessment has confirmed two ponds are not suitable for this species. No desk-top records of great crested newt have been identified within the Ulley to Bramley area.
Birds	Up to county/metropolitan	The farmland and woodland within the Ulley to Bramley area is suitable for breeding and wintering birds. Species associated with these habitats include lapwing, barn owl, skylark, tree sparrow, yellow wagtail, linnet and yellowhammer which breed in low numbers in farmland habitats, and a range of typical common woodland breeding and wintering birds. There is one desk study record from 2016 of a hobby nesting within 1km of the land required for the Proposed Scheme in the Ulley to Bramley area.
White-clawed crayfish	Up to county/metropolitan	Suitable habitat for white-clawed crayfish is likely to be present in watercourses including along Morthen Brook and some of the smaller watercourses present in the area. No desk-top records of white-clawed crayfish have been identified within the Ulley to Bramley area.
Terrestrial invertebrates	Up to district/borough	Suitable habitat for terrestrial invertebrates is likely to be found in localised areas of poor-semi improved and ruderal planting and where undisturbed grassland is present on motorway verges. No desk-top records of terrestrial invertebrates have been identified within the Ulley to Bramley area.
Aquatic invertebrates	Up to district/borough	Suitable habitat for aquatic invertebrates is likely to be present in watercourses including along Morthen Brook, smaller watercourses and drainage ditches, and in

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		water bodies (ponds). No desk-top records of aquatic invertebrates have been identified within the Ulley to Bramley area.
Fish	Up to district/borough	There are records of fish from the Water Framework Directive catchments in the area, including species such as European bullhead (listed on Annex II of the EC Habitats Directive), and brown trout. Suitable habitat for notable fish species is likely to be present within Morthen Brook and smaller watercourses and drainage ditches, along with smaller water courses and water bodies.
Reptiles	Up to district/borough	There are suitable habitats for reptiles within the land required for the Proposed Scheme, including localised areas of poor semi-improved grassland/tall ruderal planting and motorway verges. No desk-top records of reptiles have been identified within the Ulley to Bramley area.

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-o6 in the Volume 2: LA12 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:

- Thurcroft South viaduct and Thurcroft North viaduct would maintain the existing ecological connectivity under the route of the Proposed Scheme between adjacent habitats. These structures would also reduce habitat loss and fragmentation, maintaining existing species territories/populations and allowing free passage and dispersal of wildlife at these locations;
- provision of new ecological ponds (ponds lost would be replaced on a minimum 1:1 basis);
- new woodland habitat creation would contribute towards replacing woodland loss (e.g. woodland around the M1 junction 32 and woodland adjacent to the M18) and to enhance connectivity between remaining woodlands; and
- new species-rich hedgerow habitat creation, using appropriate native species, to help compensate for the loss of individual hedgerows, and to maintain and re-connect the ecological network in the surrounding areas, including along the margins of the route of the Proposed Scheme.

7.4.2 The assessment assumes implementation of the measures set out within the draft Code of Construction Practice (CoCP)^{49,50} 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:

⁴⁹ All construction will be undertaken in accordance with the Code of Construction Practice. The CoCP will also contain generic control measures and standards to be implemented throughout the full duration of the construction phase.

⁵⁰ Supporting document: Draft Code of Construction Practice

- 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 construction of the King's Pond Plantation culvert and King's Pond Plantation embankment would result in the permanent loss of 0.1ha (2%) of King's Pond Plantation LWS. In addition, there is the potential for the deterioration of water quality as a result of construction activities. However, it is anticipated that this would be avoided through measures set out in the draft CoCP. Given the extent of habitat loss this would be a permanent adverse effect which would be significant at the district/borough level.

There would be no direct effects on Pea Carr AWIS, but there would be indirect construction effects. It is anticipated that adoption of measures in the draft CoCP would reduce this effect to a level that is not significant. However, on a precautionary basis, in the absence of more detailed information, this would result in a temporary adverse effect that is significant at the district/borough level.

Habitats

Woodland

7.4.6 The construction of Thurcroft South viaduct, Thurcroft North viaduct and the Brampton-en-le Morthen embankment would result in the loss of 3.1ha of broadleaved woodland at M1 junction 32. The permanent loss of woodland habitat

would result in an effect that would be significant at up to the county/metropolitan level.

7.4.7 Construction of Bramley South cutting would result in the loss of 3.9ha of broadleaved woodland located along the M18. Given the extent of the woodland loss, and considering it is likely to be screen-planting associated with the motorway, the permanent loss of these woodlands would result in an effect that would be significant at up to the district/borough level.

7.4.8 Incorporated woodland creation is not expected to reduce the woodland loss to a level that is not significant. This is because the ongoing review may identify additional ancient woodlands, and as such the permanent loss of these woodlands would result in an effect that would be significant at up to county/metropolitan level.

Grassland

7.4.9 Outside of the designated sites discussed above, construction of the Proposed Scheme would result in the loss of grassland from this section of the route. The construction of the Bramley North cutting would result in the loss of 1.6ha of marshy grassland. In the absence of further survey information, it has been assumed that none of the grassland lost would be unimproved, and hence the loss would be significant at up to the district/borough level.

Hedgerows

7.4.10 The Proposed Scheme would result in the permanent loss of hedgerows, and would result in severance of the network in many places, adversely affecting connectivity with the surrounding area. The effects of these losses will be fully assessed in the formal ES. The Proposed Scheme includes new hedgerow planting which would help offset losses. Further hedgerow planting would be proposed as part of the design development. In the absence of this additional mitigation, the loss of these hedgerows would result in a permanent adverse effect on the conservation status of the hedgerow network that would be significant at up to the district/borough level.

Watercourses

7.4.11 The Proposed Scheme would cross Morthen Brook on the Thurcroft North viaduct. This watercourse 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.

7.4.12 The construction of the King's Pond Plantation culvert would result in the permanent loss of a section of Kingsforth Brook. This would be a permanent effect that would be significant at up to the district/borough level.

7.4.13 The construction of the Hellaby Brook inverted siphon would result in the permanent loss of a section of, and create severance of, the Hellaby Brook which would result in a permanent effect that would be significant at up to the district/borough level.

7.4.14 Land required for the Proposed Scheme would result in the permanent loss of sections of other smaller watercourses where these are culverted. This habitat loss and

fragmentation would result in an adverse effect that would be significant at up to district/borough level.

Water bodies

- 7.4.15 Seven ponds would be lost as a result of the construction of the Proposed Scheme. Great crested newt is confirmed as present in one pond and is assumed to be present in two more. Ponds would be created to replace those lost and this would reduce the effects to not significant for water bodies. Surveys have confirmed that great crested newt are not present within four of the ponds lost. Loss of the three ponds with confirmed or assumed presence would be significant at a county/metropolitan level. The loss of the remaining four ponds could result in a temporary impact that would be significant at up to county/metropolitan level, if it is confirmed through field surveys that they support other priority species.

Ancient and veteran trees

- 7.4.16 It is assumed that ancient and veteran trees within the land required for the Proposed Scheme in Ulley to Bramley area would be permanently lost. Ancient and veteran trees are an irreplaceable resource and their potential loss would result in a permanent adverse effect that is significant at the county/metropolitan level in each case.

Species

Bats

- 7.4.17 The permanent removal of vegetation may have impacts on bats. Habitat loss would reduce the availability of foraging resource, and potentially result in the loss of roosts and fragmentation of commuting routes. This could particularly affect breeding populations of bat species within the Ulley to Bramley 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. 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

- 7.4.18 The Thurcroft North viaduct would avoid loss of habitat along Morthen Brook. Indirect effects from construction activities could result in disturbance to otter, if present, during the construction period, and prevent them from moving along the corridor. However, it is anticipated that these indirect effects would be controlled through measures in the draft CoCP. Habitat loss would occur at Kingsforth Brook, Hellaby Brook and smaller watercourses that would be crossed by the route of the Proposed Scheme. Hellaby Brook inverted siphon would cause potential permanent severance effects for otter, if present. On a precautionary basis, in the absence of further survey information, impacts to otter would result in an adverse effect on the conservation status that would be significant up to the county/metropolitan level.

Water vole

- 7.4.19 The creation of the Thurcroft North viaduct would avoid loss of habitat along Morthen Brook. Indirect effects from construction activities could result in disturbance to water

vole, if present, during the construction period, and prevent them from moving along the corridor. However, it is anticipated that these indirect effects would be controlled through measures in the draft CoCP. Habitat loss would occur at Kingsforth Brook, Hellaby Brook and smaller watercourses crossed by the route of the Proposed Scheme. Hellaby Brook inverted siphon would cause potential permanent severance effects for water vole, if present. 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 these species that would be significant up to the county/metropolitan level.

Great crested newt

- 7.4.20 It has been assumed that three of the seven ponds and the surrounding terrestrial habitat within the land required for the Proposed Scheme may support great crested newts, and would be lost during construction. The loss of ponds supporting great crested newts could result in the isolation and severance of local breeding populations. The design incorporates the creation of replacement ponds. Suitable terrestrial habitat would also be required to fully mitigate effects along with links to encourage dispersal (e.g. by incorporating existing habitat or creating new habitat), and this would require further development. In the absence of the full mitigation, the loss of the ponds and surrounding land would result in a permanent adverse effect on the conservation status of great crested newts that would be significant at up to the county/metropolitan level.

Birds

- 7.4.21 Land required for Proposed Scheme would result in the loss of nesting and foraging habitat for a range of breeding and wintering birds, predominantly farmland and woodland species. These are likely to include barn owl, a Schedule 1 species in addition to hobby recorded near the M1 junction 32 and King's Pond Plantation LWS. On a precautionary basis, and in the absence of further survey information, it has been assumed that the construction of the Proposed Scheme would result in a permanent adverse effect on the bird population that would be significant at up to the county/metropolitan level.

White-clawed crayfish

- 7.4.22 The Proposed Scheme would pass over Morthen Brook on the Thurcroft North viaduct, and it is anticipated that indirect impacts to white-clawed crayfish, if present, would be controlled through measures set out in the draft CoCP. White-clawed crayfish within smaller watercourses including Kingsforth Brook and Hellaby Brook would be affected by construction. On a precautionary basis, in the absence of further survey information, it has been assumed that the Proposed Scheme would result in permanent adverse effect that would be significant at up to the county/metropolitan level.

Aquatic invertebrates

- 7.4.23 The Proposed Scheme would result in loss of habitat suitable for aquatic invertebrates, including species of principal importance. On a precautionary basis, in the absence of further survey information, it has been assumed that construction of

the Proposed Scheme would result in permanent adverse effect that would be significant at up to the district/borough level.

Terrestrial invertebrates

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

Fish

- 7.4.25 The Proposed Scheme would pass over Morthen Brook on the Thurcroft North viaduct, and indirect impacts to the fish populations would be controlled through measures set out in the draft CoCP. Fish populations within smaller watercourses including Kingsforth Brook and Hellaby Brook would still be affected and may require assessment under the Water Framework Directive. On a precautionary basis, in the absence of further survey information, it has been assumed that the Proposed Scheme would result in permanent adverse effect that would be significant at up to the district/borough level.

Reptiles

- 7.4.26 There are no records of common reptiles within 2km of the route of the Proposed Scheme, however, suitable habitat is likely to be present for reptiles. On a precautionary basis in the absence of further survey information, it has been assumed that the construction of the Proposed Scheme would result in permanent adverse effect that would be significant at up to the district/borough level.
- 7.4.27 Effects on other habitats and species that would be significant at the local/parish level during construction will be reported in the formal ES.
- 7.4.28 Indirect effects from changes in air quality, such as that arising from increased levels of construction traffic, will be considered for sites within 200m of construction routes where habitats are considered to be sensitive to air quality changes. These effects will be reported in the formal ES.

Other mitigation measures

- 7.4.29 Further measures currently being considered, but which are not yet part of the design and will be informed by the findings of the ongoing field surveys and engagement with relevant stakeholders, include:
- options to create new areas of habitat to address residual effects upon King's Pond Plantation LWS;
 - ancient woodland is an irreplaceable resource and this loss is considered to be a permanent adverse residual effect. The loss of ancient woodland would be partly compensated through a package of measures bespoke to the woodland affected. Ancient woodland soil with its associated seed bank would be salvaged and translocated to receptor sites that have, wherever possible, been chosen because they link to and/or are adjacent to ancient woodland

fragments. This would seek to increase the connectivity of fragmented ancient woodland parcels. Other measures such as planting native tree and shrub species of local provenance, enhancement of retained woodland, and translocation of coppice stools and dead wood, would be undertaken as appropriate;

- opportunities for potential wetland habitat creation in replacement floodplain storage areas, including wet woodland;
- provision of additional broadleaved woodland (non-ancient) to replace those lost, and/or enhancement of remaining woodlands;
- provision of additional hedgerows which would offset the losses and maintain the connectivity of the network;
- options to create new species-rich grasslands (including translocation where appropriate) to compensate for grassland losses;
- provision of additional measures to facilitate connectivity where significant foraging or commuting routes of fauna species would be affected;
- considering the need for inclusion of structures to reduce severance effects on bats;
- 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;
- provision of alternative roosting habitat for bats;
- provision of additional ecological mitigation ponds on a two to one basis where existing ponds supporting great crested newts are lost, outside the area required for the permanent works but within the land required for construction of the Proposed Scheme, and suitable terrestrial habitat around these ponds with habitat links to allow dispersal. Some of the above may also be achieved through strategic mitigation, which is currently being discussed with relevant stakeholders; and
- options to enhance sections of Hellaby Brook to minimise and if practicable address the severance of Hellaby Brook.

Summary of likely residual significant effects

7.4.30 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 13.

Table 13: Residual significant effects on ecological resources/features during construction

Resource/feature	Residual effect	Level at which the effect would be significant
King's Pond Plantation LWS	Loss of 0.1ha (2%) of habitat within the LWS.	Up to district/borough

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Resource/feature	Residual effect	Level at which the effect would be significant
Pea Carr AWIs	Indirect effects due to construction.	Up to district/borough.
Woodland	Potential adverse effects on unidentified ancient woodland.	Up to county/metropolitan
Grassland	Permanent loss of 1.6ha of marshy grassland north-east of Bramley and west of the M18.	Up to district/borough
Hedgerows	Permanent loss of hedgerows.	Up to district/borough
Watercourses	Loss of a small section at each of Kingsforth Brook and Hellaby Brook and severance of Hellaby Brook by the route of the Proposed Scheme.	Up to district/borough
Ancient and veteran trees	Permanent loss of individual trees.	Up to county/metropolitan
Bats	Potential permanent adverse effect on conservation status due to loss of roosts, foraging habitat and fragmentation.	Up to regional
Otter	Potential permanent adverse effect on conservation status due to habitat loss and severance of watercourses.	Up to county/metropolitan.
Water vole	Potential permanent adverse effect on conservation status due to habitat loss and severance.	Up to county/metropolitan.
Great crested newts	Loss of three ponds that, subject to survey findings, may contain great crested newt and surrounding terrestrial habitat and severance from adjacent areas of terrestrial habitat which may support great crested newts.	Up to county/metropolitan.
Birds	Potential loss of nesting and foraging habitat for a range of breeding and wintering birds.	Up to county/metropolitan.
White-clawed crayfish	Potential permanent adverse effect on conservation status due to habitat loss and severance by the route of the Proposed Scheme.	Up to county/metropolitan.
Aquatic invertebrates	Potential loss of habitat suitable for aquatic invertebrates.	Up to district/borough
Terrestrial invertebrates	Potential loss of habitat suitable for terrestrial invertebrates.	Up to district/borough
Fish	Potential loss of habitat suitable for a range of fish species.	Up to district/borough
Reptiles	Potential loss of habitat suitable to support a range of common reptile species.	Up to district/borough

7.5 Effects arising during operation

Avoidance and mitigation measures

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

Assessment of impacts and effects

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

7.5.3 Bats are at risk of being struck by trains or possibly harmed by turbulence, particularly at frequently used commuting/foraging routes 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, 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 result in a permanent adverse effect that would also be significant at up to county/metropolitan level. Effects on all other habitats and species would likely be significant at the local/parish level during operation. These effects will be assessed and reported in the formal ES.

Other mitigation measures

7.5.5 Additional mitigation measures currently being considered include:

- updating the HS2 barn owl mitigation plan⁵¹ which has been developed to provide measures that would 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 local landowners;
- other structures to reduce mortality to bats; and
- options to enhance sections of Hellaby Brook to mitigate/compensate for the severance of Hellaby Brook.

Summary of likely residual significant effects

7.5.6 Taking into account mitigation included as part of the Proposed Scheme design, the anticipated significant residual ecological effects during operation are detailed in Table 14.

⁵¹ Currently in development for Phase One of HS2

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Table 14: Residual significant effects on ecological resources/features during operation

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

Monitoring

- 7.5.7 Volume 1, Section 9, sets out the general approach to environmental monitoring during operation of the Proposed Scheme.
- 7.5.8 There are no area-specific requirements for monitoring ecology and biodiversity effects or mitigation during the operation of the Proposed Scheme in the Ulley to Bramley area.

8 Health

8.1 Introduction

- 8.1.1 This section identifies the communities within the Ulley to Bramley 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 Public Health England, relevant directors of Public Health and Health and Wellbeing Boards, and relevant Clinical Commissioning Groups. The purpose of the engagement has been to understand health issues in the Ulley to Bramley area that may not be identified solely through a review of publicly available data. Engagement with key public health bodies will continue as part of the development of the Proposed Scheme.
- 8.1.3 This section deals specifically with impacts and effects at a local level within the Ulley to Bramley 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: LA12 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, Introduction and Methodology and the Scope and Methodology Report (SMR)⁵².
- 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 Ulley to Bramley area are:
- for impacts during construction (temporary and permanent):
 - neighbourhood quality;

⁵² Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

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

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 Ulley to Bramley area

8.3.1 The Ulley to Bramley area is characterised by towns, villages, hamlets and clusters of individual properties located parallel to the M1 and the M18. As reported in Section 14, Traffic and transport, there are a number of PRoW within the vicinity of the route of the Proposed Scheme, which provide access to the countryside and are considered important to health and wellbeing.

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

Thurcroft, Brampton-en-le-Morthen and Morthen

- 8.3.3 The village of Thurcroft is to the east of the route of the Proposed Scheme comprising approximately 3,050 residential properties, the nearest of which would be approximately 150m from the route. The village of Brampton-en-le-Morthen is also to the east of the route, connected to Thurcroft by Brampton Road; the village comprises approximately 35 residential properties, the nearest of which would be approximately 190m from the route. The hamlet of Morthen, to the west of the route, comprises approximately 20 residential properties, the nearest of which would be approximately 850m from the route.
- 8.3.4 The majority of community resources are located within Thurcroft and include a pre-school, an infant school, a secondary school, a village hall, a community hall, allotments, a nursing home and a place of worship. In addition, Woodhouse Green and a recreational ground located within Thurcroft provide recreational opportunities for local communities.

Bramley, Hellaby and surrounds

- 8.3.5 The village of Bramley comprises approximately 8,000 residential properties, the nearest of which would be approximately 90m to the west of the route of the Proposed Scheme. Community resources within Bramley include an infant school, a primary school, a junior school, a youth centre, a village hall, care homes and a place of worship. In addition, Wickersley Wood and Moat Wood which are located to the south of Bramley, provide recreational opportunities for local communities.
- 8.3.6 The village of Hellaby is to the east of the route of the Proposed Scheme and is connected to Bramley by the A631 Bawtry Road. Hellaby comprises approximately 250 residential properties, the nearest of which would be approximately 285m from the route. The northern boundary of Hellaby is dominated by Hellaby Industrial Estate.

Demographic and health profile of the Ulley to Bramley area

- 8.3.7 The local communities in the Ulley to Bramley area have a relatively low population density, commensurate with the rural nature of the area.
- 8.3.8 Data provided by the Office of National Statistics⁵³ for the local authority area of Rotherham Metropolitan Borough Council (RMBC), shows that this population has a broadly similar health status compared with the national (England) averages.

⁵³ The Office for National Statistics (ONS) provides spatial data on levels of deprivation, using indicators of: 'multiple deprivation', 'employment', 'education', 'barriers to housing and social services', 'crime' and 'living environment'. These data are available by Lower Super Output area.

- 8.3.9 The population has similar levels of deprivation to the national average, with regard to the combined indices of multiple deprivation⁵⁴, and the health domain (a sub-set of the indices of multiple deprivation).
- 8.3.10 The available data provide information down to local authority level and enables a demographic and health profile to be made of the population within the Ulley to Bramley area. The description of the whole population, and the populations within local authority, does not exclude the possibility that there will be some individuals or small groups of people who do not conform to the overall profile.

8.4 Effects arising during construction

Avoidance and mitigation measures

- 8.4.1 Consideration of potential health issues is an integral part of the planning and design of the Proposed Scheme, alongside consideration of other environmental, community and economic issues. 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 PRoW and roads to maintain access (see Section 14, Traffic and transport for further detail).
- 8.4.2 In addition, the locations of construction compounds and site haul routes have been selected to reduce exposure to construction impacts insofar as reasonably practicable.
- 8.4.3 HS2 Ltd would require its contractors to comply with the environmental management regime for the Proposed Scheme, which would include the measures set out in the draft Code of Construction Practice (CoCP)⁵⁵, 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 insofar 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

⁵⁴ 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>

⁵⁵ Supporting document: Draft Code of Construction Practice

appropriate information; and to be the first point of contact to resolve community issues. The nominated undertaker would be required to take reasonable steps to engage with the community, focusing on those who may be affected by construction impacts, including local residents, businesses, landowners and community resources, and the specific needs of protected groups (as defined in the Equality Act 2010).

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

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

Assessment of impacts and effects

Neighbourhood quality

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

8.4.8 The construction of the Proposed Scheme would affect neighbourhood quality through impacts such as noise, air emissions, visual impacts and additional traffic, including heavy goods vehicles (HGV). These will be assessed in the relevant sections of the formal ES, with a focus on those receptors, or groups of receptors, that are most affected. The Community section of the formal ES will provide a combined assessment, which will identify locations that are subject to significant environmental effects 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 Ulley to Bramley 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 would have temporary and permanent⁵⁶ impacts on neighbourhood quality in areas close to construction sites. Impacts on neighbourhood quality have the potential to affect the wellbeing of residents adversely during the construction phase, by giving rise to negative feelings in relation to quality of life and the local environment, and potentially changing behaviours, such as deterring the use of outdoor space.
- 8.4.13 Construction activities would have the potential to generate a noticeable change in noise at outdoor areas and at neighbourhoods in proximity to the route of the Proposed Scheme, as reported in Section 13, Sound, noise and vibration. It is currently expected that the construction of the Proposed Scheme may be visible from nearby neighbourhoods, as reported in Section 11, Landscape and visual. This has the potential to contribute to impacts on neighbourhood quality and will be assessed in the formal ES.
- 8.4.14 Traffic and transport impacts in the Ulley to Bramley area would include:
- construction vehicle movements to and from the various construction compounds and sites;
 - temporary and permanent road closures and associated diversions; and
 - temporary and permanent alternative routes for PRow.
- 8.4.15 Construction traffic, including HGV, would be present on a number of roads in this area, as reported in Section 14, Traffic and transport.
- 8.4.16 The link between health and the aesthetic value of the public realm is not well understood, but there is moderate evidence to suggest that an attractive environment can improve people's enjoyment and sense of wellbeing. Conversely, poor quality environments have been shown to have negative effects on people's health. There is moderate evidence that people have a preference for views of natural environments over man-made environments, and that exposure to views of natural environments is associated with increased wellbeing.
- 8.4.17 Overall, it is considered that the construction of the Proposed Scheme has the potential to affect wellbeing through changes to neighbourhood quality. This will be assessed in the formal ES.

Access to services, health and social care

- 8.4.18 There is strong evidence linking access to healthcare facilities with health outcomes, and there is also weak to moderate evidence to suggest that transport problems are a

⁵⁶ 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.

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

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

Access to green space, recreation and physical activity

- 8.4.20 There is moderate evidence to show that access to green space contributes to good mental health. There is also moderate evidence that environmental factors such as access to high quality green space, safety and local amenity, can influence participation in physical activity. Physical activity is strongly linked to health outcomes.
- 8.4.21 Construction of the Proposed Scheme may impact on levels of access to green space and physical activity, including:
- impacts on PRoW, including temporary closures, diversions and loss of amenity, which may deter the use of these routes by walkers, cyclists and equestrians;
 - any loss of green space or facility used for physical activity; and
 - the presence of construction traffic, including HGV, on the local road network, which may deter their use by walkers, cyclists and equestrians.
- 8.4.22 There would be direct impacts on access to green space, recreation and physical activity where approximately 50% of the allotments located off Brampton Road in Thurcroft would be permanently lost due to the construction and operation of the Proposed Scheme. In addition, the B6060 Morthen Road overbridge would require the access road to the allotments to be permanently closed. As there is no alternative access to the allotments, they could no longer be used.
- 8.4.23 As reported in Section 14, Traffic and transport, the route of the Proposed Scheme would intersect a number of PRoW in the Ulley to Bramley area. The impacts on amenity and recreational value of these footpath networks, and therefore levels of physical activity and associated health and wellbeing benefits, will be assessed in the formal ES.
- 8.4.24 Construction traffic would mainly use site haul routes along the route of the Proposed Scheme. Some construction traffic, however, including HGV, would be present on local roads. This could obstruct or deter pedestrians, cyclists and equestrians from using these routes. Health effects associated with these impacts, including

consideration of levels of use and available alternative routes for active travel and recreation, will be assessed in the formal ES.

Social capital

- 8.4.25 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:
- 8.4.26 '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.'⁵⁷
- 8.4.27 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.
- 8.4.28 The settlements along the route support small, well-established communities. The size of the temporary construction workforce may be substantial relative to the size of these local communities. During the day, the workforce would be present on construction sites and compounds throughout the area, including main compounds and satellite compounds in the vicinity of the settlements of Brampton-en-le-Morthen, Morthen, Thurcroft, Bramley and Hellaby. The duration of the works at each site ranges from approximately one year and nine months to five years and three months. The presence of construction workers is likely to be noticeable, with construction vehicles using local roads to access compounds and workers using facilities such as shops, restaurants and public houses within settlements.
- 8.4.29 The introduction of a temporary construction workforce into communities could have the potential to alter people's perceptions and interactions within their communities, modifying behaviour and the value they place on social capital. Such a reduction in social capital has the potential to adversely affect wellbeing, and may influence behaviours that are beneficial to wellbeing such as the use of community facilities.
- 8.4.30 The draft CoCP includes a commitment to produce and implement a community engagement framework and provide appropriately experienced community relations personnel. HS2 Ltd will engage with local authorities and community representatives to identify measures aimed at fostering and maintaining good relationships between the workforce and local communities. Any measures identified will be included within the community engagement framework as appropriate. Road closures and diversions

⁵⁷ Office for National Statistics- Measuring Social Capital:
http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/dcp171766_371693.pdf

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

Other mitigation measures

- 8.4.31 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.
- 8.4.32 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.
- 8.4.33 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 Ulley to Bramley area will be reported in the formal ES.

Assessment of impacts and effects

Neighbourhood quality

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

Access to green space, recreation and physical activity

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

Other mitigation measures

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

Monitoring

- 8.5.5 Volume 1, Introduction and Methodology, Section 9, sets out the general approach to environmental monitoring during operation of the Proposed Scheme.
- 8.5.6 No area-specific monitoring of health effects during the operation of the Proposed Scheme have been identified at this stage.

9 Historic environment

9.1 Introduction

- 9.1.1 This section of the report provides a description of the current baseline for heritage assets and the likely impacts and significant effects identified to date resulting from the construction and operation of the Proposed Scheme within the Ulley to Bramley 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, Sheffield City Region and Rotherham Metropolitan Borough Council (RMBC). 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: LA12 Map Book. Only designated heritage assets within the Ulley to Bramley area are shown on maps CT-10-106b to CT-10-111a. Non-designated heritage assets have also been assessed as part of this work, although they are not illustrated on these maps.
- 9.1.4 A gazetteer of designated and non-designated heritage assets with accompanying maps will be included in the formal ES. The formal ES will also include a Historic Landscape Characterisation Report, which will identify historic landscape character areas potentially affected by the Proposed Scheme.
- 9.1.5 Assets have been identified using the National Heritage List for England (NHLE) or Historic Environment Record (HER) name and number. If no record number is known (e.g. an asset identified from historic mapping), then the asset is referred to by name. Project-specific asset identification numbers will be used for the formal ES.

9.2 Scope, assumptions and limitations

- 9.2.1 The scope, key assumptions and limitations for the historic environment assessment are set out in full in Volume 1 (Section 8) and the Scope and Methodology Report (SMR)⁵⁸, 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 Proposed Scheme would occur largely through the physical removal and alteration of heritage assets and changes to their setting.

⁵⁸ Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

- 9.2.3 The study area within which a detailed assessment of all assets, designated and non-designated, has been carried out is defined as the land required for the Proposed Scheme plus 500m. This is referred to in the remainder of this assessment as the 500m study area.
- 9.2.4 The setting of all designated heritage assets within a study area of up to 2km from the land required for the Proposed Scheme has been considered. This is referred to in the remainder of this assessment as the 2km study area.
- 9.2.5 The historic environment methodology includes the consideration of the relevant intra-project effects. These interactions will be included in the assessment of impacts and effects in the formal ES.
- 9.2.6 Where noise is considered, this is within the context of the contribution that this makes to the heritage 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 Roman Road, Catcliffe to Oldcotes (SYHER 12479) asset lies within the land required for construction of the Proposed Scheme and may be affected, any effect is unlikely to be significant. 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.
- 9.2.9 Common features of the historic landscape such as marl pits, field boundaries and former areas of ridge and furrow are not individually considered but have been included in the baseline, as part of the historic landscape character and will be considered as part of the overall assessment of impacts on historic landscape reported in the formal ES.
- 9.2.10 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 reported within the formal ES;
 - desk-based assessment is ongoing and data on non-designated heritage assets will be described more fully in the formal ES and accompanying technical appendices; and
 - intra-project topic assessments are ongoing and will be considered as part of the assessment of historic environment effects within the formal ES.

9.3 Environmental baseline

Existing baseline

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

- the NHLE (Historic England register of designated heritage assets);
- South Yorkshire Historic Environment Record (SYHER);
- RMBC archives and local studies service and information on conservation areas; and
- historic maps and aerial photography.

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

Designated assets

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

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

- a scheduled monument of high value: Hellaby, a deserted medieval village and well, enclosure, ridge and furrow and post-medieval longhouse (NHLE 1009393);
- four Grade II* listed buildings of high value: Thurcroft Hall (NHLE 1314692), Morthen Hall (NHLE 1192970), Hellaby Hall (NHLE 1192650) and the Church of St James (in Ravenfield, NHLE 1151867);
- fifty nine Grade II listed buildings of moderate value. The majority of these are located in the conservation areas of Ulley, Brampton-en-le-Morthen, Wickersley or Ravenfield. The buildings consist of a mixture of domestic structures, including isolated farmhouses, smaller scale mansions and halls. Most are of 16th to 18th century date; and
- five conservation areas of moderate value: Ulley Conservation Area, Brampton-en-le-Morthen Conservation Area, Thurcroft Conservation Area, Wickersley Conservation Area and Ravenfield Conservation Area.

Non-designated assets

9.3.5 One non-designated heritage asset of moderate value is located wholly or partially within the land required for the Proposed Scheme: Roman Road, Catcliffe to Oldcotes (SYHER 12479).

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

- an early Iron Age to Roman period enclosure and field system, located north of Slacks Farm, Bramley (SYHER 5470);
- an Iron Age or Roman-British Field system with Ridge and Furrow located off Sandy Lane. Although the majority has been destroyed by housing some survives at Kings Ling (SYHER 7146 and SYHER 3716); and
- an early Iron Age to Roman period enclosure and field system (SYHER 13322), at Braithwell Common.

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:

- Hellaby Deserted Medieval Village, Hellaby (SYHER 4405),
- seven built heritage assets in Thurcroft of low value dating from the medieval to post-medieval period,
- three World War II military sites of low value (SYHER 12250, SYHER12264 and SYHER12194), and
- ten other assets of low value, including evidence for prehistoric to medieval activity.

Historic environment overview

9.3.8 The superficial geological deposits which have, to a certain extent, dictated how people have used the landscape over time, include glacial till and outcropping coal in the north-eastern part of the Ulley to Bramley area and head deposits formed on clay, silt, sand and gravel in the south-east part of the area. An isolated region of similar deposits also exists to the west, between Brinsworth and Whiston. This has contributed to shallow mining occurring in the region.

9.3.9 Mesolithic and Neolithic evidence from the wider area is restricted to finds of worked flint. In addition, polished stone axes have been found at Whiston and Wickersley (SYHER 9778) and a small quantity of worked flints has been recovered from Wadsworth.

9.3.10 Evidence of Bronze Age activity in the Ulley to Bramley area is similarly sparse, with no artefacts located within the study area. A key feature of the Iron Age in the Yorkshire region is the ditched field system. There are a number of such monuments attributed to this period in the Ulley to Bramley area (SYHER 5470; SYHER 3717; SYHER 3716 and SYHER 13322).

9.3.11 The network of Roman roads in Yorkshire includes two which pass through or close to the Ulley to Bramley area. One of these, later known as Ricknield Street, came to form the parish boundaries between Brampton and Thurcroft, and Bramley and Hellaby. A short section of this road has been recorded in excavations at Ulley (SYHER 12479).

Elsewhere, finds of Roman material, principally coins, have been made at Bramley and Wickersley (SYHER 9695; SYHER 11273).

- 9.3.12 Evidence from the early medieval period in the Ulley to Bramley area is limited almost entirely to place-names. Morthen, for example, was the site of an Anglo-Scandinavian district assembly, and Thurcroft derives its name from a hybrid of a Norse personal name and the Old English word for enclosed field. Remains of ridge and furrow, a characteristic of medieval arable cultivation, were formerly widespread in the study area but have been progressively erased by modern ploughing (SYHER 7146).
- 9.3.13 Although the majority of settlements recorded in the Norman Domesday Book remain occupied to the present day, the village of Hellaby (SYHER 4405) seems to have become deserted before 1538 (the site of the village was re-occupied on a smaller scale after 1600). At Moat Farm in Wickersley surviving earthworks have been interpreted as a moat of medieval date (SYHER 3843). Generally, however, very little evidence of medieval building can be found within the Ulley to Bramley area.
- 9.3.14 The post-medieval period is characterised by increasing agricultural prosperity, and a resultant investment in farms, agricultural buildings and houses of the gentry. Survivors of the latter include Ulley Hall (NHLE 1151849), Ulley Grange (NHLE 1193449), Morthen Hall (NHLE 1192970), Thurcroft Hall (NHLE 1314692) and Hellaby Hall (NHLE 1192650), all constructed between 1675 and 1725. Farms at Morthen, Brampton-en-le-Morthen, Carr Lane, Laughten-en-le-Morthen and Bramley contain fabric elements of 16th century date.
- 9.3.15 From the mid-18th century onwards industrial activities were an increasingly prominent feature of the area. Quarrying for stone with which to make grindstones occurred around Wickersley during the 18th and 19th centuries and Thurcroft Colliery was established in the early 20th century. Opencast coal mining in the area began in 1942 and continued until recently.
- 9.3.16 There are 20th century defensive features present across the area, with anti-aircraft battery positions found east of Ulley (SYHER 12250) and Kingsforth Lane, air-raid shelters in Thurcroft and a 'starfish' bombing decoy site north of Ulley⁵⁹ (SYHER 12194).

9.4 Effects arising during construction

Avoidance and mitigation measures

- 9.4.1 The design of the Proposed Scheme has sought to avoid impacts on heritage assets within the area insofar as reasonably practicable.
- 9.4.2 Section 8 of the draft Code of Construction Practice (CoCP)⁶⁰ 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

⁵⁹ Starfish sites were large-scale night-time decoys created during WWII to divert German night bombers from their intended targets

⁶⁰ Supporting document: Draft Code of Construction Practice

to be retained within the land required for the Proposed Scheme;

- route-wide principles, standards and techniques for works affecting heritage assets; and
- a programme of historic environment investigation and recording (including archaeology and historic buildings) to be undertaken prior to or during construction works affecting the heritage assets.

Assessment of impacts and effects

Temporary effects

- 9.4.3 The construction works, comprising excavations and earthworks and including temporary works such as construction compounds, storage areas, and diversion of existing roads and services, have the potential to affect heritage assets during the construction period. Impacts would occur to assets both within the land required for the Proposed Scheme and to assets in the wider study area as a result of changes to their settings.
- 9.4.4 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 Morthen Hall (NHLE 1192970) is a Grade II* listed building of high value located approximately 400m to the north-west of the Proposed Scheme. It is a well-preserved example of 18th century manorial architecture with equally well-preserved 19th century fittings and additions. Several heritage assets of moderate value are associated with it, including a ha-ha⁶¹, gates, gate piers and a perimeter wall to the front garden, all of which are collectively designated as a Grade II listed building (NHLE 1132689), as well as a former stable-block and coach-house (NHLE 1314650). The hall derives most of its value from the physical structure itself, in terms of the architectural form and the building materials, both of which have historic interest and potential to aid future research. The hall's setting includes the intimacy of the gardens which surround it, from where its architectural value can be appreciated. There are views southward and south-eastward across the landscape from the hall's principal facade; these include glimpses of the M18 through deciduous vegetation within the hall's curtilage and along Morthen Hall Lane, and are also orientated towards the Proposed Scheme. The setting contributes to the asset's value by virtue of the partial seclusion and formal arrangement of the gardens and, to a lesser extent, by the hall's elevation and consequent relationship with the wider landscape. This setting would temporarily change as a result of activity associated with the construction of Springvale embankment, Springvale cutting and the presence of Springvale embankment main compound and Springvale embankment transfer node. The nearest construction activity would be located 345m to the east of the hall, and would be closer than the nearest permanent scheme element (the Thurcroft grid supply point), and at a less oblique viewing angle. The compound and construction activities would introduce visual disturbance into views from and of the asset within its

⁶¹ A ditch with a wall on its inner side below ground level, forming a boundary to a park or a garden, without interrupting the view

landscape setting, diminishing the degree to which the setting would aid appreciation of the asset, and thereby harming its value. This would constitute a low magnitude of impact and a moderate adverse effect.

Permanent effects

- 9.4.6 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.
- 9.4.7 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.
- 9.4.8 The Iron Age or Roman-British Enclosure and Field System at Slacks Farm, Bramley (SYHER 5470), the Iron Age or Roman-British Field System at Sandy Lane (SYHER 3716 and SYHER 7146) and Iron Age to Roman-British enclosures and field boundaries at Braithwell Common (SYHER 13322), non-designated assets of low value, would be directly affected by the Proposed Scheme. The below-ground remains at both sites potentially contain evidence from which an understanding of the area's Iron Age or Roman past could be derived. Their removal during construction of the Proposed Scheme would constitute a high magnitude of impact and a moderate adverse effect.
- 9.4.9 No significant effects are currently expected to occur as a result of permanent impact on the setting of designated or non-designated heritage assets.

Other mitigation measures

- 9.4.10 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

- 9.4.11 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.
- 9.4.12 As no specific mitigation measures have yet been identified in relation to the heritage assets described above, it is currently anticipated that the residual effects would be the same as those reported in the assessment of effects during operation. 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 CT-06 Map Series within the Volume 2: LA12 Map Book:

- noise mitigation measures have been included within the Proposed Scheme to reduce potential impacts on identified assets; and
- landscape planting would 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 It is currently anticipated 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.

Other mitigation measures

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

Summary of likely residual significant effects

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

Monitoring

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

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

10 Land quality

10.1 Introduction

- 10.1.1 This section of the report presents the baseline conditions that exist along the Proposed Scheme in the Ulley to Bramley area in relation to land quality, and reports the likely impacts and significant effects identified to date resulting from construction and operation of the Proposed Scheme. Consideration is given to land that potentially contains contamination and land that has special geological significance, either from a scientific, historical, mineral exploitation or mineral resources point of view including geological sites of special scientific interest (SSSI) and local geological sites (LGS), areas of historical mining activity in the context of land quality and areas of designated mineral resources. Consideration is also given to petroleum (including gas) prospects and licensing.
- 10.1.2 Engagement has been undertaken with the British Geological Survey (BGS), Doncaster Metropolitan Borough Council (DMBC) and Rotherham Metropolitan Borough Council (RMBC), the Environment Agency, Fera Science Limited (FSL)⁶², the Animal and Plant Health Agency (APHA) and the Sheffield Area Geology Trust (SAGT)⁶³. 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: LA12 Map Book.
- 10.1.4 Land contamination issues are closely linked with those involving water resources and waste. Issues regarding groundwater resources are addressed in Section 15, Water resources and flood risk. Issues regarding the disposal of waste materials, including contaminated soils, are addressed in Volume 3: Route-wide effects (Section 15).

10.2 Scope, assumptions and limitations

- 10.2.1 The scope, assumptions and limitations for the land quality assessment are set out in Volume 1, Section 8 and the Scope and Methodology Report (SMR)⁶⁴.
- 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.

⁶² Formerly known as the Food and Environment Research Agency

⁶³ Formerly known as the South Yorkshire RIGS Group

⁶⁴ 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 highways during a drive through survey. 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 resources⁶⁵ identified on published mineral plans, and existing planning or licenced areas. Any inference of minerals provided by geological maps/reports is excluded (except where these are covered by the Minerals Plan).
- 10.2.8 The geo-conservation assessment is based upon publicly available local geological trust records.

10.3 Environmental baseline

Existing baseline

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

⁶⁵ Defined in the SMR as 'mineral body including aggregates, salt, coal and other hydrocarbons, Petroleum Extraction Development Licences (PEDLs), Shale Prospective Areas (SPAs)'

Geology

- 10.3.2 This section describes the underlying ground conditions within the Ulley to Bramley area. Recent changes in lithostratigraphic classifications by the BGS have been incorporated where appropriate⁶⁶.
- 10.3.3 Table 15 provides a summary of the geology (made ground, superficial and bedrock units) underlying the Proposed Scheme in the study areas.

Table 15: Summary of the geology underlying the land quality study area.

Geology	Distribution	Formation description	Aquifer classification
Made ground			
Made ground	Associated with embankments forming parts of the M1/M18, infilled railway cuttings developed areas, landfills and industrial areas	Artificial ground comprising variable deposits of reworked natural and man-made materials	Not classified
Superficial			
Alluvium	Along minor water course within Hellaby Industrial Estate	Clay and silt	Secondary A
Bedrock			
Pennine Upper Coal Measures	Layered formation within the centre and north of the study area.	Mudstone, siltstone and sandstone. Dominantly sandstone, with rare, poor quality coal seams.	Secondary A
Pennine Middle Coal Measures	Outcropping along the southern most kilometre of the study area; no coal seams mapped within the study area.	Mudstone, siltstone and, 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, colliery spoil heaps or earthworks associated with construction or ground improvement. Such deposits may be poorly mapped and are often very variable in composition. Minor deposits of made ground may be encountered within this area, for example where ponds or shallow mineral excavations have been backfilled.
- 10.3.5 More significant deposits of made ground are likely be associated with historical and contemporary industrial, infrastructure and commercial land-use within the study area, including Hellaby Industrial Estate, a sewage works, an electrical transformer station and former landfills. Localised made ground is also anticipated to be associated with infilled features such as mine shafts, localised infilled ponds and ground, and dismantled mineral railways.

⁶⁶ British Geological Survey, (2014), *A lithostratigraphical framework for the Carboniferous successions of southern Great Britain (onshore)*. Research Report RR/09/01. Available online at: <http://nora.nerc.ac.uk/id/eprint/8281/1/RR09001.pdf>

- 10.3.6 British Geological Survey Artificial Ground mapping⁶⁷ identifies made ground deposits within the study area. These appear largely associated with historical and contemporary transport infrastructure, particular embankments forming parts of the M1/M18 and infilled railway cuttings. Additionally, areas of artificial ground are associated with Hellaby Industrial Estate and landfills.
- 10.3.7 No farm burial or pyre sites associated with the 2001 or 1967 outbreak of foot and mouth disease (FMD) are known to be present within the study area. The APHA Foot and Mouth Disease County Status Maps⁶⁸ identify that Derbyshire was reported as free of FMD during the 2001 outbreak. However, older unrecorded sites may be present from the 1967 outbreak. Similarly, anthrax-infected cattle burials may be present, generally relating to burials 50 to 100 years ago. However, no records have been found of such burials. In all cases, the records do not provide an exact location for the burial or pyre sites and other, unrecorded sites are likely to be present.

Superficial geology

- 10.3.8 Limited deposits of alluvium comprising clay and silt have been identified to the east of the study area associated with a surface water course that intersects the Proposed Scheme and Hellaby Industrial Estate.

Bedrock geology

- 10.3.9 The bedrock geology in this area comprises the Pennine Upper Coal Measures and Pennine Middle Coal Measures formations, consisting of interbedded coal, mudstones, siltstones and sandstones. The southern section of the study area is underlain by the Pennine Middle Coal Measures. The Cambriense Marine Band (a fossiliferous mudstone which marks the top of the Pennine Middle Coal Measures) outcrops 1km north of the start of the Ulley to Bramley study area in the vicinity of Ulley Beeches. To the north of this band, the Pennine Upper Coal Measures outcrop.
- 10.3.10 Sandstone dominates the Pennine Upper Coal Measures in the Ulley to Bramley area; the named outcrops in this area are the Ackworth, Dalton, Wickersley and Ravensfield Rocks.
- 10.3.11 The northern-most section of the Ulley to Bramley area enters again into siltstone and mudstone outcrops.
- 10.3.12 There is one mapped coal seam outcrop within the Ulley to Bramley area, located in the north of the study area. This is associated with a small area of probable coal working. Working of Coal is identified by the Coal Authority at 'considerable' depth (>100m bgl) beneath the study area.

Radon

- 10.3.13 Radon is a radioactive gas formed by the radioactive decay of naturally occurring uranium in rocks and soils. The occurrence of radon gas is shown in the BGS Radon

⁶⁷ British Geological Survey Artificial Ground on DiGMapGB as depicted on the 1:10,000 published map

⁶⁸ APHA Foot and Mouth Disease County Status Maps online from https://data.defra.gov.uk/Agriculture/APHA0704-FMD_County_Status_20011029.jpg

Potential Dataset⁶⁹. In the Ulley to Bramley area, it is stated that <1 % of homes are estimated to have radon levels at or above the action level of 200 becquerels per cubic metre of air (Bq/m³).

Groundwater

- 10.3.14 One category of aquifer has been identified within the study area, as defined by the Environment Agency. All superficial deposits and bedrock strata within the study area are classified as Secondary A aquifers.
- 10.3.15 There is one source protection zone (SPZ)⁷⁰ 1 area within the study area in the Hellaby Industrial Estate, with the associated zone 2 and zone 3 areas extending westwards under the Proposed Scheme, to the edge of Bramley. However, records of an associated groundwater abstraction licence for this SPZ was not identified. There are no groundwater Drinking Water Safeguarding Zones within the study area.
- 10.3.16 Details of the licensed abstractions are provided in Section 15, Water resources and flood risk. It should be noted that all abstractions that are used directly or indirectly for human consumption are by default designated as SPZ. In such cases the abstraction point qualifies for a default 10m radius for SPZ1 and a default 250m radius for SPZ2. There is no default SPZ3 for total catchment with respect to this type of abstraction.
- 10.3.17 There are no registered private unlicensed groundwater abstractions within the study area. However, as there is no obligation to register private water supplies, unregistered private surface water supplies may be present.
- 10.3.18 Further information on the groundwater within the Ulley to Bramley area is provided in Section 15, Water resources and flood risk.

Surface water

- 10.3.19 As presented in Section 15, Water resources and flood risk, the following watercourses are within the study area (south to north) The Water Framework Directive (WFD) designation of each watercourse is shown in brackets:
- Two tributaries of the Ulley Brook (4 and 5) at Penny Hill (Ordinary Watercourse);
 - Morthen Brook and Morthen Brook tributaries 1, 2 and 3 at Thurcroft viaduct (Ordinary Watercourse);
 - Pinch Mill Brook crossing of B6060 Morthen Road (Ordinary Watercourse);
 - Kingsforth Brook at King's Pond Plantation (Ordinary Watercourse);
 - King's Pond (Static water body);

⁶⁹ Available at: <http://www.bgs.ac.uk/radon/hpa-bgs.html>. This dataset underpins Public Health England's Indicative Atlas of Radon in England and Wales (Miles J.C.H, Appleton J.D, Rees D.M, Green B.M.R, Adlam K.A.M and Myers, A.H. (2007). Indicative Atlas of Radon in England and Wales. Public Health England. ISBN: 978-0-85951-608-2. 29 pp) available at www.ukradon.org/information/ukmaps.

⁷⁰ 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.

- Tributary of Hellaby Brook (Ordinary Watercourse); and
- Hellaby Brook (Ordinary Watercourse).

10.3.20 There is one licenced surface water abstraction within the study area. This abstraction is located adjacent to the Proposed Scheme where it intersects the tributary of the Hellaby Brook and is used for agricultural irrigation. It is considered to be a high value receptor. There are no registered private unlicensed surface water abstractions within the study area. However, as there is no obligation to register private water supplies, unregistered private surface water supplies may be present.

10.3.21 There are two consented discharges to surface waters within the study area related to private and public sewerage discharges.

10.3.22 Further information on surface water within the Ulley to Bramley area is provided in Section 15, Water resources and flood risk.

Current and historical land use

10.3.23 Current potentially contaminative land uses within the study area include: activities within industrial estates, an operational sewage works, a number of petrol filling stations, vehicle workshops and garages, a cemetery and electrical distribution infrastructure, together with several farms. There is one active waste management facility within the study area, namely Gorsefield Farm Compost Facility, Lidget Lane, Bramley.

10.3.24 Historical land uses identified within the study area with the potential to have caused contamination include four landfill sites, as shown in Table 16, former railway lines, historical industrial or commercial land-use, former vehicle fuelling or maintenance sites, infilled ponds and a former colliery site.

10.3.25 Further details of these key current and historical contaminative land uses within the study area are shown in Table 16, Table 17 and Table 18.

Table 16: Current and historical landfill sites located in the study area

Name and area reference	Location	Description
Hellaby Landfill (closed) (LA12-808)	Common Lane, Ravenfield, Rotherham	Historical landfill site that operated between 1973 and 1979 and included industrial, commercial, household and liquid/sludge waste types. Appears to feature infilling of a former railway line in the north of the study area.
Hellaby Lane (closed) (LA12-1254)	Braithwell Way, Hellaby, Rotherham	Historical landfill site partly within former railway cutting) that opened in 1983 (closure date unknown), used mainly for inert waste.
Bantry Road (closed) (LA12-826)	North of Ranworth Road, Bramley, Rotherham	Historical landfill site that opened in 1949 (closure date unknown) which included inert, industrial, commercial, household and liquid/sludge waste types.

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Table 17: Current and historical mining, mineral sites and colliery spoil sites located in the study area

Name and area reference	Location	Description
Unnamed area of probable shallow mining (LA12-2474, 2475)	North of Hellaby Industrial Estate, Ravenfield,	Historical shallow coal mining site (date of operation unknown).

Table 18: Current and historical industrial sites located in the study area

Name and area reference	Location	Description
Vehicle workshops and garages, petrol filling stations (LA12-823, 833, 843, 848, 849, 852, 2066, 2068, 2471)	Several sites, mainly in Bramley and Hellaby, Rotherham in the vicinity of the J1 M18, with two sites in Thurcroft.	Active and former petrol stations sites along A631 Bawtry Road and at Morrison supermarket. Underground fuel storage and distribution systems.
Operational sewage works (LA12-825)	south of Common Lane Braithwaite Common	Active sewage works, with potential for made ground, sewage sludge, ground gas potential, power transformation and screenings disposals.
Electrical distribution and generation infrastructure (LA12-829, 2056)	Electrical transformer station at Nether Moor Field, and electricity sub-station at Penny Hill Windfarm	National Grid transformer station featuring large transformer equipment, tanks and workshops. Smaller transformer station at Penny Hill Wind Farm.
Former railway line (LA12-3680)	The track of a former railway line north of Common Lane.	Historical potential contamination associated with contemporary and historical railway use.
Gorsefield Farm Compost Facility (LA12-851)	Lidget Lane, north of Bramley	Active waste management facility located at Gorsefield Farm. Aerial imagery suggests extensive material stockpiling, semi derelict buildings and possible tipping.
Industrial and trading estates, and depot land-use (LA12-822, 831, 856, 2470)	Industrial areas around Hellaby (J1 M18) and outlying smaller industrial land uses north of Thurcroft	Several active light industrial and trading estates and a large council or highways depot. Hellaby industrial estate (LA12-831) includes a small area of infilled ground reported as containing inert materials for construction of the industrial site.

- 10.3.26 Contaminants commonly associated with sites in Table 16, Table 17 and Table 18 could include metals, semi-metals, asbestos, organic and inorganic compounds. Infilled pits and landfills could also give rise to landfill gases such as methane or carbon dioxide and leachate.
- 10.3.27 Additional contaminants associated with coal extraction identified in Table 17 could include acid mine drainage and mine gases.
- 10.3.28 Additional contaminants associated with the range of industrial uses identified in Table 18 within the Ulley to Bramley area include Polychlorinated biphenyls (PCB) and pathogens.

Other regulatory data

- 10.3.29 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). There were two significant pollution incidents reported between 1997 and 2014.

- 10.3.30 The first significant incident recorded was a pollution incident to water, occurring in 2007 south of the Hellaby Industrial Estate and involving general biodegradable materials and wastes. The second incident was a significant impact to water and minor impact to land, occurring in 2014 at Slacks Farm and involving sewage.
- 10.3.31 There are two consented discharges to surface waters within the study area related to private and public sewerage discharges.
- 10.3.32 There are no Control of Major Accident Hazards (COMAH) sites within the Ulley to Bramley area.
- 10.3.33 There are no nationally significant ecological designations as defined in the land quality section of the SMR⁷¹ located within the study area.

Mining/mineral resources

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

Mineral plans

- 10.3.35 DMBC and RMBC have developed a joint approach to minerals planning for their combined authority areas, with the most recent Local Aggregates Assessment being published in 2017⁷². This document identifies the Proposed Scheme as an infrastructure project that may contribute to local demand for minerals.

Sand, gravel and clay deposits

- 10.3.36 During a consultation exercise with RMBC in 2015, to support the Rotherham Local Plan (as presented in the Minerals Background Paper⁷³), it was proposed that the Ulley to Bramley area would be within a combined Minerals Safeguarding Area (MSA) to protect fireclay, brick clay and shallow coal resources. No MSA related to sand, gravel and gravel, limestone or deep coal reserves were proposed in this consultation.

Coal mining

- 10.3.37 The majority of the Ulley to Bramley area is underlain by the Pennine Upper Coal Measures and Pennine Middle Coal Measures. It is within a Coal Authority Mining Reporting Area and appears to have had coal resources worked at considerable depth

⁷¹ Sensitive ecological receptors are defined as national designations such as SSSIs

⁷² DMBC and RMBC Local Aggregates Assessment 2017. Downloaded from <http://www.doncaster.gov.uk/services/planning/minerals> (February 2018)

⁷³ RMBC 2015 Rotherham Local Plan Publication Site & policies Minerals Background Paper Downloaded from http://www.rotherham.gov.uk/localplanexamination/downloads/file/197/eb78_minerals_-_minerals_background_paper_september_2015 (January 2018)

(as defined by the Coal Authority as >100m below ground level), and a small area of shallow (<30m below ground level) working on the north of the study area.

Open cast coal mining

- 10.3.38 The Ulley to Bramley area is identified by the Coal Authority as being within a Surface Coal Resource Area, and is likely to also be within an MSA for shallow coal resources which could be worked by open cast methods.

Deep coal mining

- 10.3.39 Geological mapping from the BGS shows that the Ulley to Bramley area is underlain by coal seams at depth and have the potential to be exploited in the future, for both coal and coal bed methane. However, deep coal resources are not included within the proposed RMBC MSA. Petroleum Exploration and Development Licences/Hydrocarbons.
- 10.3.40 The Ulley to Bramley area is within PEDL areas 43, 305 and 304, and the Bowland Shale Prospective Area. It is also within land parcels offered within the 14th Onshore Oil and Gas Licensing Round in 2014. As such, it is considered that the study area is within an area where hydrocarbon resources including coalbed methane could be identified and extracted in the future.

Geo-conservation resources

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

Receptors

- 10.3.42 The sensitive receptors that have been identified within the study area are summarised in Table 19. A definition of receptor sensitivity is given in the SMR.

Table 19: Summary of sensitive receptors

Issue	Receptor type	Receptor description	Receptor sensitivity
Land contamination	People	Residents of existing properties, occupants and users of nurseries, schools, study centres, play areas, parks and public open space	High
		Users of allotments, commercial areas, retail parks and hotels	Moderate
		Users of industrial land	Low
	Groundwater	Secondary A aquifers	Moderate
	Surface waters	Tributaries of Ulley Brook (Water Framework Directive (WFD Status: Good)	Low
		Morthen Brook and tributaries (WFD Status: Good)	Low
Kingsforth Brook (WFD Status: Poor)		Low	

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Issue	Receptor type	Receptor description	Receptor sensitivity
		Kings Pond (WFD Status: Moderate)	Poor
		Hellaby Brook and tributaries (WFD status: Poor)	Low
		Pinch Mill Brook (WFD status: Moderate)	Moderate
	Built environment	Existing underground infrastructure and buried services.	Low
Impacts on mining/mineral and petroleum (gas) sites (severance and sterilisation)	Mining/mineral sites	Fireclay, brick clay and shallow coal resources mineral safeguarding area.	Medium
		PEDL areas 43, 305 and 304, and the Bowland Shale Prospective Area	High

10.4 Effects arising during construction

Avoidance and mitigation measures

10.4.1 The construction assessment takes into account the mitigation measures described in the draft Code of Construction Practice (CoCP)⁷⁴. The draft CoCP sets out the measures and standards of work that would be applied to the construction of the Proposed Scheme and includes requirements to ensure the effective management and control of work in contaminated areas.

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

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

⁷⁴ Supporting document: Draft Code of Construction Practice

- 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 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 CLR11⁷⁵ and British Standards BS10175⁷⁶ and BS8576⁷⁷.
- 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 UK⁷⁸. The preferred option would then be developed into a remediation strategy.
- 10.4.5 Contaminated soils excavated within the site, where practicable, would be treated to remove or render contamination inactive and reused within the Proposed Scheme where needed and suitable for use. Treatment techniques are likely to include stabilisation, soil washing and bio-remediation. Contaminated soil removed off-site would be taken to a soil treatment facility, another construction site (for treatment and reuse) or to an appropriately permitted landfill.

Assessment of impacts and effects

- 10.4.6 Construction of the Proposed Scheme in this area would require earthworks, utility diversions, deep foundations, grouting and ground stabilisation and other activities, including the construction of the various viaducts and road infrastructure works. These aspects of the Proposed Scheme, along with other construction features, are shown on the Map Series CT-05 in the Volume 2: LA12 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

⁷⁵ Environment Agency, (2004), *CLR11 Model Procedures for the Management of Land Contamination*

⁷⁶ British Standard, (2011), *BS10175+A2:2017 Investigation of Potentially Contaminated Sites*

⁷⁷ British Standard, (2013) *BS8576 Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)*

⁷⁸ Sustainable Remediation Forum UK, (2010), *A Framework for Assessing the Sustainability of Soil and Groundwater Remediation*

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risk assessments are historical or current landfills, industrial, mining and commercial sites.

10.4.8 CSMs have been produced for those areas taken to detailed risk assessments. The following factors determine the need for detailed risk assessments:

- whether the site is located on or off the route of the Proposed Scheme or associated off line works;
- 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 20. 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 20: Summary of baseline CSM for sites which may pose a contaminative risk for the Proposed Scheme

Area reference ⁷⁹	Area name	Human health risk	Groundwater risk	Surface water risk	Ecosystem risk	Buildings risk
On site⁸⁰						
LA12 – 1	Cemetery	Low to Moderate	Moderate/low	Very low	N/A	Very low to Low
LA12 – LA12-813, LA12-819, LA12-851, LA12-2059	Multiple Farms (Farms, allotments and horticultural nurseries) grouped for purposes of assessment, all located over a Secondary A aquifer)	Low to Moderate/low	Moderate/low	Low	N/A	Low
LA12 – 826	Bantry Road Landfill	Moderate/low to High	Moderate	Low	N/A	Low to Moderate

⁷⁹ Each potentially contaminated site is allocated a unique reference number

⁸⁰ 'On site' is within the area of land required for construction of the Proposed Scheme

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Area reference ⁷⁹	Area name	Human health risk	Groundwater risk	Surface water risk	Ecosystem risk	Buildings risk
LA12 – 822, LA12-831, LA12-836, LA12-856, LA12-2468, LA12-2469, LA12-2470	Multiple Works, Industrial and trading estates and factories within Hellaby and Bramley.	Low to Moderate/low	Moderate/low	Moderate/low	N/A	Very low to Low
LA12 – 833, LA12-843, LA12-849, LA12-2068	Various vehicle workshops, garages and a car showroom in Bramley, Hellaby and Thurcroft.	Low to Moderate	Moderate	Moderate/low	N/A	Low
LA12 – 823, LA12-848	Petrol stations in Bramley, Hellaby and Thurcroft.	Low to Moderate	Moderate	Moderate/low	N/A	Low
LA12 – 825	Sewage Works, Braithwell Common	Low to Moderate/low	Low	Low	N/A	Low
LA12 – 3680	Railway Lines	Low to Moderate/low	Low	Low	N/A	Very low to Moderate/low
	Off site ⁸¹					
LA12 – 2074, LA12-2475	Shallow coal mining area	Low to Moderate/low	Low	Low	N/A	Very low to Moderate
LA12 –829, LA12-2056	Electrical transformer and sub-station	Low to Moderate	Moderate/low	Low	N/A	Low
LA12 – 820, LA12-846, LA12-852, LA12-2067, LA12-2068	Various vehicle workshops, garages and a car showroom in Bramley, Hellaby and Thurcroft.	Low to Moderate	Moderate	Moderate/low	N/A	Low
LA12–2072, LA12-2464	Multiple Farms (Farms, allotments and horticultural nurseries) grouped for purposes of assessment, all located over a Secondary A aquifer)	Low to Moderate/low	Moderate/low	Low	N/A	Low
LA12-2471, LA12-2066	Petrol stations in Bramley, Hellaby and Thurcroft.	Low to Moderate	Moderate	Moderate/low	N/A	Low

⁸¹ 'Off site' is beyond the land required for construction of the Proposed Scheme but within 250m of it

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Area reference ⁷⁹	Area name	Human health risk	Groundwater risk	Surface water risk	Ecosystem risk	Buildings risk
LA12 – 808, LA12-1254	Hellaby Landfill and Hellaby Lane landfill	Moderate/low to Moderate	Moderate	Very low	N/A	Low to 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. Once updated this will also include mining related contamination.
- 10.4.14 All of the sites set out in Table 20 have been assessed for the temporary change in impact associated with the construction stage and were found to have non-significant effects.
- 10.4.15 In the event that unexpected contamination is encountered during the construction of the route in this area, this would be remediated as described in the draft CoCP resulting in an overall beneficial effect.
- 10.4.16 Construction compounds located in this study area would 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.
- 10.4.17 The extent to which mine water and mine gas is controlled is subject to ongoing investigation. For mining sites, potential for significant adverse effects has been identified associated with mine gas and mine water in historical workings. Any mitigation measures required will be identified, in consultation with authoritative consultees, including measures to be set out in the draft CoCP, to mitigate any significant effects.

Permanent effects

- 10.4.18 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.

- 10.4.19 The magnitude of the permanent effects and their significance have been determined by assessing the change in risk between the main baseline risk and the main post-construction risk. Therefore, where there is no change between the main baseline risk and the main post-construction risk, the permanent effect significance is deemed to be negligible even if the risk is assessed to remain as high. This would be the case where the construction of the Proposed Scheme 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 negative effects and an improvement would result in positive effects.
- 10.4.20 All of the sites set out in Table 20 have been assessed for the change in impact associated with the permanent post construction stage. There are no construction stage (or post construction stage) significant effects identified in the study area.
- 10.4.21 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 would be controlled to an acceptable level.

Mining/mineral resources

- 10.4.22 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 severance⁸² or isolation that may occur during the construction phase of the Proposed Scheme, possibly continuing through to its operation.
- 10.4.23 The route of the Proposed Scheme would cross an MSA for fireclay, brick clay and shallow coal extraction.

Temporary effects

- 10.4.24 Temporary adverse effects may occur where construction compounds are proposed within the MSA. In such cases, there would be a temporary sterilisation of the resource during construction works, but this is not considered to represent a significant effect and the resource would not be lost permanently. All compounds within the study area fall within the proposed MSA for fireclay, brick clay and shallow coal extraction.

Permanent effects

- 10.4.25 The majority of effects on mining and mineral sites would be permanent. The effects of construction of the Proposed Scheme on the proposed MSA for fireclay, brick clay and shallow coal extraction would be permanent where they are beneath the footprint of the permanent works, with a strip of mineral becoming sterilised.

⁸² 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

Coal mining - deep

- 10.4.26 The permanent effect of the Proposed Scheme on the identified deep coal resource is considered to be negligible and is therefore not significant. Deep reserves are not currently worked beneath the Ulley to Bramley area and, whilst future application to resume deep extraction cannot be fully excluded, given the narrow strip of permanent works and likely depth of coal workings, significant effects associated with construction of the Proposed Scheme are unlikely.

Petroleum Exploration and Development Licences

- 10.4.27 The permanent effect of the Proposed Scheme on the identified PEDLs is considered to be minor adverse and is therefore not significant. Underlying bedrock strata that could yield a productive hydrocarbon resource are at considerable depth below the Ulley to Bramley area and, whilst exploration and development licences have been granted, significant effects associated with construction of the Proposed Scheme are unlikely.
- 10.4.28 Table 21 reports the assessment of permanent effects from construction on the mining and mineral resources identified.

Table 21: Summary of effects for mining and mineral resources

Site name	Status	Description	Sensitivity/ value	Magnitude of impact	Effect and significance (Y/N)
Minerals Safeguarding Area	MSA	Fireclay, brick clay and shallow coal mineral safeguarding area.	Medium	Negligible	Negligible (N)
Deep coal mining	Reserves not currently worked	Coal reserves at depth, last worked in 2013	Medium	Negligible	Negligible (N)
PEDL areas 43, 305 and 304, Bowland Shale Prospective Area	Reserves not currently worked	PEDL areas 43, 305 and 304, and the Bowland Shale Prospective Area	High	Minor	Minor adverse (N)

Geo-conservation sites

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

Other mitigation measures

- 10.4.30 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.

- 10.4.31 Mitigation of the effects on mineral resources within the proposed MSA 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 DMBC and RMBC, and any other relevant parties to assist in achieving an effective management of minerals within the affected location of the MSA.

Summary of likely residual significant effects

- 10.4.32 Based on the information currently available and with the application of the mitigation measures detailed above, no likely significant residual effects are anticipated with respect to land quality.

10.5 Effects arising from operation

- 10.5.1 Users of the Proposed Scheme (i.e. rail passengers) are at all routine times within a controlled environment (i.e. within trains), and have therefore been scoped out of the assessment.

Avoidance and mitigation measures

- 10.5.2 Maintenance and operation of the Proposed Scheme would be in accordance with environmental legislation and good practice. Spillage and pollution response procedures similar to those to be outlined in the draft CoCP would be established for all high risk activities and employees would be trained in responding to such incidents.

Assessment of impacts and effects

- 10.5.3 The Proposed Scheme within this area would include one auto-transformer feeder station and grid supply points located at Thurcroft and a smaller auto-transformer station at Bramley. Auto-transformer feeder stations and sub-stations can, in principle, be a source of contamination through accidental discharge or leaks of coolant. However, in common with other modern sub-stations, secondary containment appropriate to the level of risk would be included in the installed design.
- 10.5.4 The operation of the trains may give rise to minor contamination through leakage of hydraulic or lubricating oils. However, such leakage or spillage is expected to be very small and unlikely to result in significant contamination.

Other mitigation measures

- 10.5.5 No other mitigation measures are expected to be required beyond what has already been outlined relating to land quality in the study area.

Summary of likely residual significant effects

- 10.5.6 No significant residual effects are anticipated associated with operation of the Proposed Scheme.

Monitoring

- 10.5.7 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme. Requirements for monitoring would be determined as part of the investigation, treatment and validation of contamination on a site specific basis as part of the detailed design process. Monitoring requirements may include water quality, air quality and/or bulk and trace gases, depending on the site being considered.

11 Landscape and visual

11.1 Introduction

- 11.1.1 This section of the report presents the assessment of the likely significant landscape and visual effects identified to date within the Ulley to Bramley 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 Rotherham Metropolitan Borough Council (RMBC) 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: LA12 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)⁸³.
- 11.2.2 Summer surveys for the landscape and visual assessment were undertaken from July to September 2017 and winter surveys between October 2017 and February 2018 to inform the assessment. Further surveys will be undertaken to inform the assessment and will be reported in the formal ES.
- 11.2.3 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

⁸³ Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

about the level of sensitivity and magnitude of change on a case by case basis. This will be adjusted, as appropriate, on the basis of survey results to inform the formal ES.

- 11.2.4 The extent of the study area has been informed by construction and operational phase zones of theoretical visibility (ZTV). The ZTVs have been produced in line with the methodology described in the SMR and are an indication of the theoretical visibility of the Proposed Scheme. In some locations, extensive vegetation cover would mean the actual extent of visibility is substantially less than that shown in the ZTVs, and professional judgement will be used to further refine the study area to focus on likely significant effects.
- 11.2.5 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.
- 11.2.6 Landscape and visual receptors within approximately 1.5km of the route of the Proposed Scheme have been assessed as part of the study area. Long distance views of up to 1km have been considered at settlement edges, such as at Ulley, Wickersley, Bramley and Thurcroft.
- 11.2.7 This assessment is based on preliminary design information and makes reasonable worst case assumptions on the nature of potentially significant effects where these can be substantiated. It is based on information known at present. The assessment of landscape and visual effects during construction covers the situation in winter of year 1. The assessment of visual effects during construction covers the situation in winter of year 1. The assessment of operational visual effects covers the situation in winter and summer of year 1 and summer of year 15. The assessment of landscape effects is undertaken for the construction phase and for the operational phase at both year 1 and year 15. The landscape assessment does not consider seasonal variations e.g. winter/summer, since these do not affect character. Likely significant landscape and visual effects for year 30 will be reported in the formal ES.
- 11.2.8 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 Landscape Character Area (LCA). Full judgements on value, susceptibility and sensitivity will be provided in the formal ES.
- 11.2.9 The assessment has been carried out on the basis that design of structures would, insofar as reasonably practicable, integrate with existing skyline features and would make use of a simple, clean and coherent palette of materials to help structures fit in the landscape.

11.3 Environmental baseline

Existing baseline

Landscape baseline

- 11.3.1 The study area extends from the north of the village of Hardwick (located in the Staveley to Aston area (LA11)) in the south to Bramley in the north. It is an undulating landscape across higher ground to the east of the River Rother Valley. Local high points include Penny Hill at 110m above Ordnance Datum (AOD) to the south-west and Carr Hill (150m AOD) to the east of the study area.
- 11.3.2 Land cover is dominated by agricultural farmland, consisting typically of medium to large sized fields, mainly in arable use, with some smaller areas of open moorland. There are some smaller areas of pasture west of Brampton-en-le-Morthen, between Thurcroft and Wickersley, and north of Bramley. Field boundaries are variable in character across the study area, often consisting of low and gappy hedgerows with occasional hedgerow trees. Woodland cover is also relatively sparse, the most notable areas being Wickersley Wood and King's Pond Plantation, to the south-east of Wickersley, and larger areas of mixed woodland to the north-east of Thurcroft and north-west of Sunnyside.
- 11.3.3 The undulating and often elevated terrain and the nature of the land cover contribute to an open and large-scale landscape. However, it is recognised that in lower lying areas, particularly in the valleys and nearer settlement edges, the scale of the landscape is reduced.
- 11.3.4 The study area contains a number of larger settlements, such as Bramley and Thurcroft on the periphery of the study area, as well as hamlets along with numerous scattered farmsteads and properties. The settled areas are linked by a network of rural PRoW. Penny Hill Wind Farm, the M1/M18 corridor, the M1 junction 32, and electricity infrastructure form notable vertical and linear components in the landscape. The landscape is mainly rural in character however settlement edges and former mining sites at Thurcroft, Hellaby and Maltby, which have now been reclaimed and converted to woodland or large-scale industrial and warehouse sites, alter this character in places.
- 11.3.5 The LCAs have been determined as part of an integrated process of environmental characterisation, informed by a review of historic landscape mapping and the outcome from other topics including ecological assessments. These LCAs will be refined, as appropriate, upon review of available historic landscape characterisation data and will be included in the formal ES. Use has been made of published landscape character assessments and a wide range of supporting GIS data, aerial photography and Ordnance Survey mapping, plus desk study and fieldwork. Landscape character assessments reviewed include the relevant National Landscape Character Areas and the Rotherham Landscape Character Assessment and Landscape Capacity Study⁸⁴.

⁸⁴ Rotherham Metropolitan Borough Council (2009) *LEB29 Landscape Character Assessment and Landscape Capacity Study 2010. The Landscape Partnership, Bedford*

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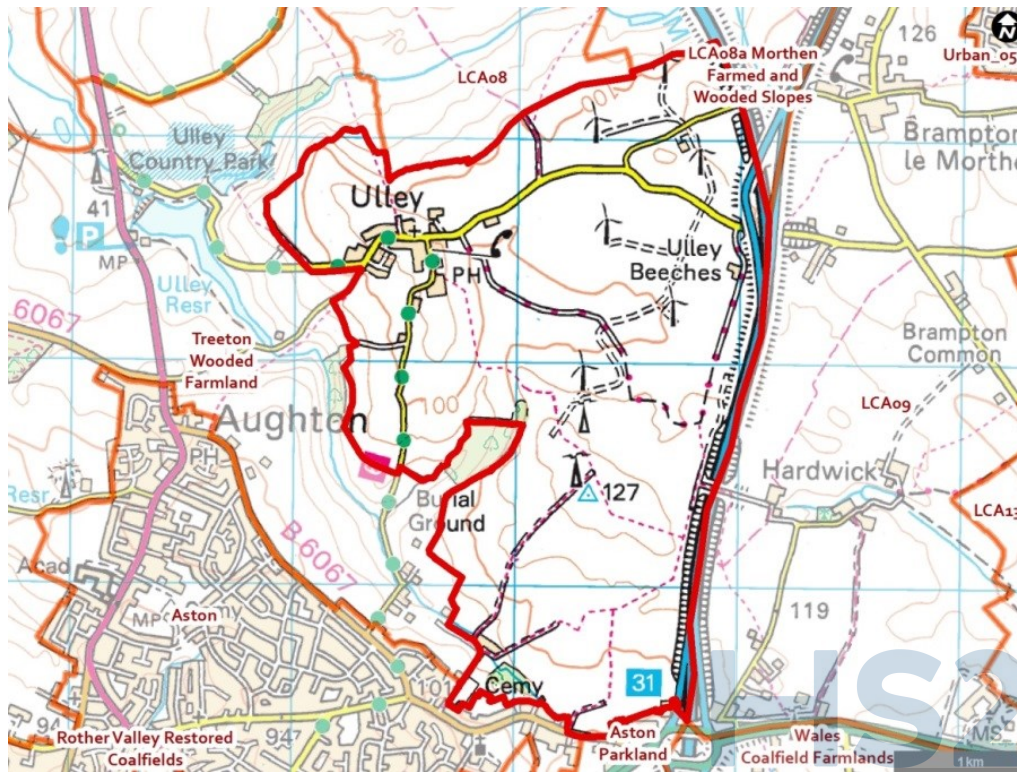
- 11.3.6 These published LCAs have been adapted for this assessment to provide LCAs of an appropriate and consistent scale.
- 11.3.7 For the purposes of this assessment, the study area for the Ulley to Bramley area has been subdivided into 19 LCAs based on the published LCAs. These LCAs are draft and subject to review in consultation with local planning authorities. Full descriptions of all LCAs will be provided in Volume 5 of the formal ES.
- 11.3.8 Eleven of the 19 LCAs would not be significantly affected by the Proposed Scheme on account of their relationship with the Proposed Scheme and its effects on the key characteristics of each landscape. Micklebring Farmland LCA would be significantly affected by the Proposed Scheme and is included in Volume 2: Community Area report LA13 Ravenfield to Clayton as it is located for the most part within the Ravenfield to Clayton area. A summary of the remaining four LCAs that would be significantly affected within the Ulley to Bramley area is provided in Table 22.

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Table 22: Summary of significantly affected LCAs

Ulley Enclosed Farmland



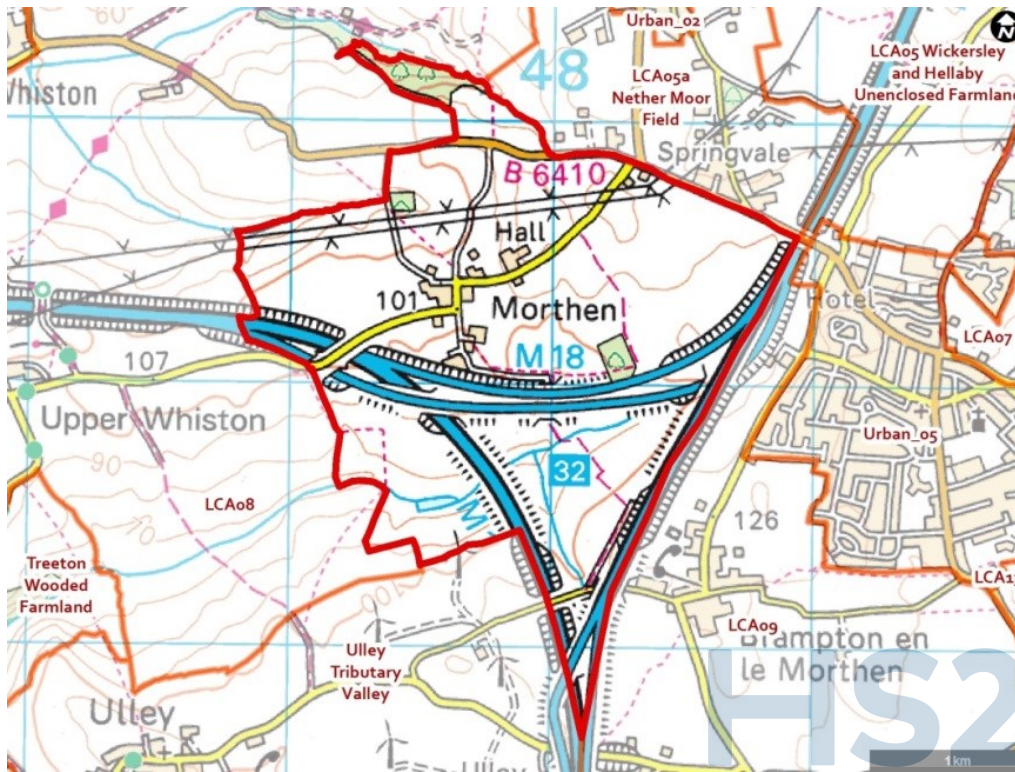
Strong field boundaries near settlement edge, large wind turbines on elevated terrain to east of LCA



Ulley Enclosed Farmland LCA lies between the urban area of Aston to the south-west and the M1/M18 corridor and M1 junction 32, to the north and east. The area is defined by a steeply undulating plateau edge, rising to a high point of 128m AOD, east of the Ulley Brook Valley which runs into the River Rother Valley further west. Land cover is predominantly arable farming and some areas of isolated pasture associated with settlement edges. The area is sparsely wooded, with tree cover limited to small shelterbelts, tree-lined roads and byways, field boundaries and planting associated with the motorway corridors. This contributes to a variable landscape scale of medium to large. The LCA is enclosed and more intimate near the historic village of Ulley, but larger in scale to the south where the elevated landform gives it a more open character. The LCA is crossed by winding country lanes and unpaved byways and is bounded by the M1 that runs along the eastern edge, and includes the M1 junction 32 located to the north-east. The landscape is generally rural and quite tranquil in character. However, the presence of the M1 to the east detracts from these qualities. The aesthetic qualities of the landscape are altered by the six wind turbines (135m in height to the tip of the blades) of the Penny Hill Wind Farm, located to the north of this LCA and forming prominent vertical features in views in this direction. Long distance views to the west, gained from elevated vantage points, overlook the River Rother Valley to Sheffield and the Peak District beyond.

Due to the terrain, land cover, heritage and perceptual qualities as described above the value of this LCA is considered to be medium.

Morthen Farmed and Wooded Slopes



M1 junction 32 influences this landscape



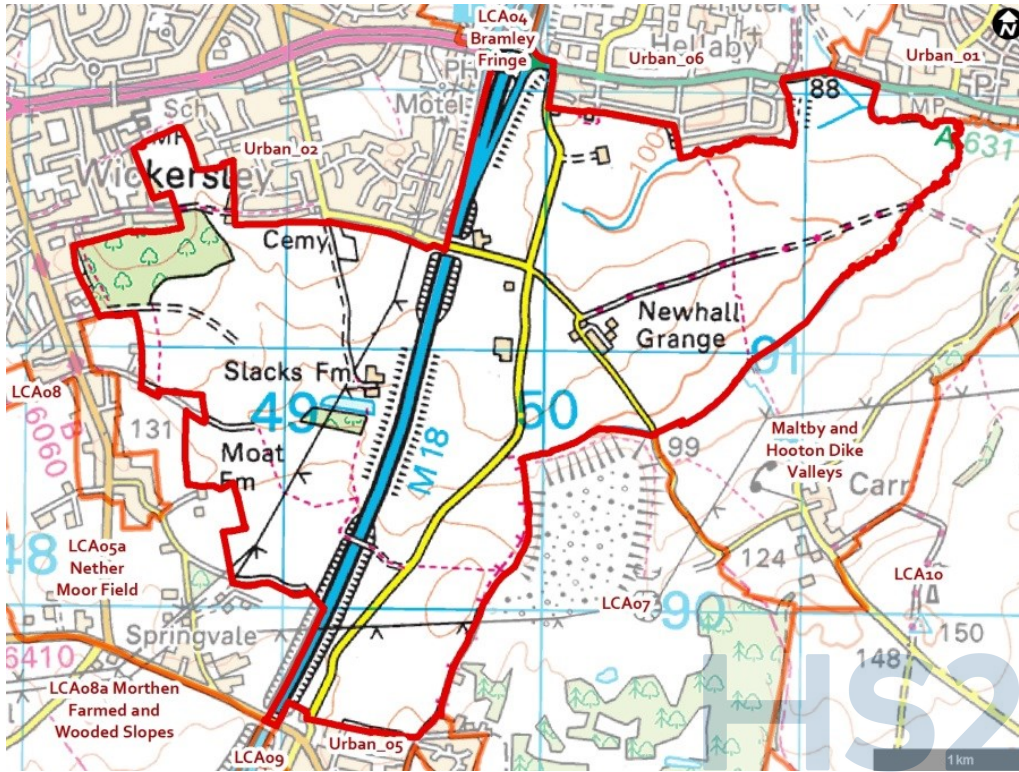
Open prospects allows long distance views



The Morthen Farmed and Wooded Slopes LCA lies to the south of Bramley, focused around the settlement of Morthen and the M1 junction 32. The terrain comprises a ridge of elevated land orientated north-east to south-west to the north of Morthen Brook, with the land rising again to the south of this valley. Farming is the dominant land use, with land cover comprising mainly arable farming, with a field pattern of medium to larger sized irregular shaped fields. The LCA contains some small pockets of woodland, shelterbelts, tree-lined roads, field boundary trees and tree planting associated with the motorways. The majority of field boundaries are defined by hedgerows, the quality of which varies throughout area, but are typically low and gappy within areas of arable land. The landscape is medium scale, but longer distance views to the west give a sense of the scale being larger. The area contains the small rural village of Morthen, which includes a number of historic buildings constructed from Magnesian Limestone. This settlement and its historic buildings, the Grade II* listed Morthen Hall, PRoW network including the Rotherham Round Walk, undulating farmed landscape and pockets of woodland all contribute to the landscape value. However, the M1 junction 32 is a large feature, which bisects and alters the character of the southern part of the LCA, detracting from its rural qualities. The aesthetic qualities of the landscape have been altered by the prevalence of a double line of overhead powerlines. Penny Hill Wind Farm, located in the neighbouring LCA to the south (Ulley Enclosed Farmland) is also prominent in outward views in this direction.

Due to the terrain, land cover, heritage and perceptual qualities as described above the value of this LCA is considered to be medium.

Wickersley and Hellaby Unenclosed Farmland



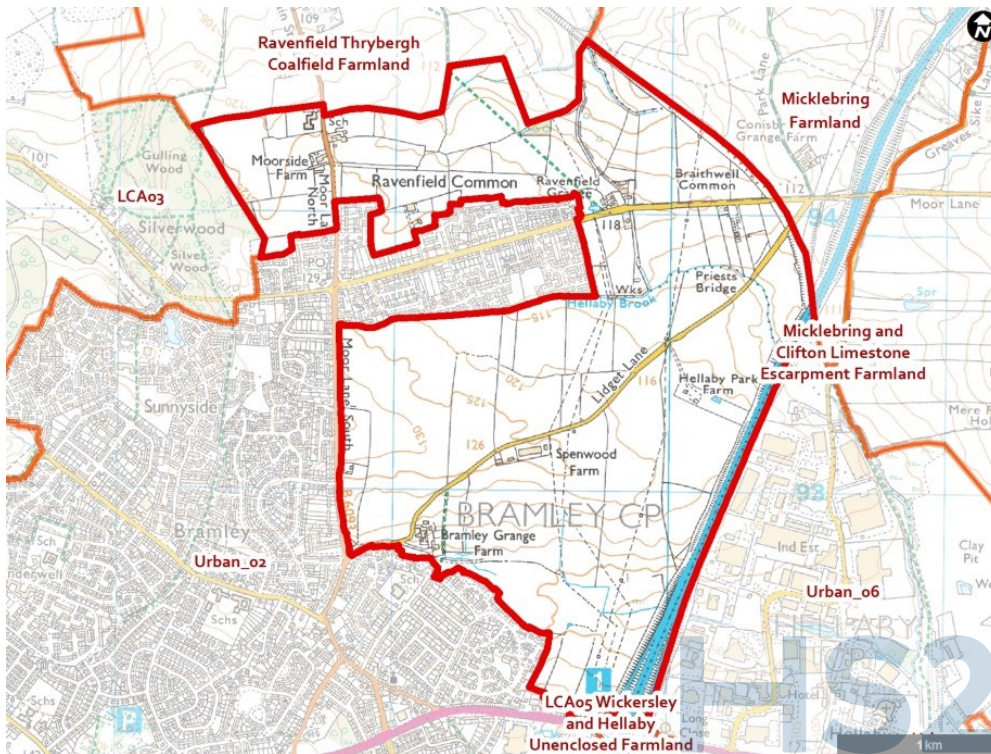
Large-scale landscape with arable farmland, gently rolling terrain and surrounding settlement on elevated land



Wickersley and Hellaby Unenclosed Farmland LCA lies to the south-east of Wickersley, south of Hellaby and north of Thurcroft. The M18 bisects this area, running north to south, forming a notable infrastructure corridor along with electricity powerlines and associated pylons. The landscape is gently rolling between the higher ground of Carr Hill in the east and Wickersley in the west. It is generally a large-scale and open landscape, though areas demonstrating a more intimate scale can be found along the settlement edge in the north. Land use is dominated by farming, with predominantly large to medium sized fields of arable land with an irregular field pattern. Apart from the ancient woodland at Wickersley Wood, and some small mixed woodland copses at King's Pond Plantation and Moat Wood, the area is relatively sparsely wooded. A scattering of isolated mature trees located within large arable fields create a more notable feature in the north-west of the LCA. Field boundaries predominantly consist of low hedgerows, gappy in parts with few hedgerow trees. Some field boundary hedgerows are remnant or have been removed entirely leaving an open, less structured landscape. The area is largely rural in character, though the visual prominence of the infrastructure corridor, overhead electricity lines and larger settlements edges affect this.

Due to the terrain, land cover and perceptual qualities as described above the value of this LCA is considered to be medium.

Bramley Fringe



Influence of existing settlements, motorway and large-scale electricity infrastructure on the rural character



The Bramley Fringe LCA lies between Bramley to the west, and the M18 and Hellaby Industrial Estate by to the east. The terrain is gently undulating, rising to a high point of 135m AOD at Moor Lane South. Land use is mainly farmland with a mixture of large arable fields to the south, as well as smaller narrow fields used for arable crops and pasture to the north of Bramley. Tree cover is sparse, limited to smaller areas of woodland around Bramley recreation grounds, vegetation associated with the motorway corridor and junction and occasional tree-lined roads. Field boundaries are predominantly formed by low hedgerows, which are gappy in parts with few hedgerow trees. This contributes to an area with an open character and larger sense of scale. The LCA is sparsely populated containing a small number of scattered farmsteads. Few roads run through this area. A recreation ground, nearby allotments and PRoW that cross the area all contribute to landscape value. The landscape is generally rural and tranquil; however, the influence of the surrounding settlement of Bramley results in the area having an urban fringe character. The rural and tranquil qualities of the landscape have also been affected by the prevalence of stark urban edges, the motorway and overhead powerlines that pass through the landscape. Elevated land to the west contributes to the sense of place as it provides a rural backdrop in views in this direction. The terrain also provides open views eastward from the higher ground to the west. These views look over farmland, the motorway corridor and Hellaby Industrial Estate, towards a higher ridge of land upon which the settlement of Maltby is located.

Due to the terrain, land cover and perceptual qualities as described above the overall value of this LCA is considered to be medium.

Visual baseline

- 11.3.9 A summary description of the distribution and types of receptors most likely to be affected is provided below. The viewpoints are numbered to identify their locations and are shown on the viewpoint location maps (see Volume 2: LA12 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: Recreational⁸⁵, 4: Transport, 5: Hotels/healthcare/education and 6: Employment.
- 11.3.10 Views across the Ulley to Bramley study area can generally be gained from public highways, PRow, settlements, residential properties and employment areas.
- 11.3.11 Residential views from the edges of settlements are often filtered/framed by intervening hedgerows and garden vegetation. This includes views from Bramley and Wickersley, both of which sit on higher ground to the west of the study area. Villages and hamlets such as Ulley and Morthen, the latter of which looks down over the Morthen Brook Valley, and numerous individual farmsteads and properties across the study area also experience outward views.
- 11.3.12 There are views from recreational areas and PRow across the study area. This includes views from PRow and public roads to the west such as from First Lane and Second Lane, south and east of Wickersley, and PRow to the north and east of Ulley. Views from recreational areas and PRow at more elevated positions provide longer range and panoramic vantage points. These overlook the undulating agricultural landscape, albeit with some visual filtering provided by hedgerows and hedgerow trees, which would change with the seasons.
- 11.3.13 Views for motorists and road users travelling on the road network, including the major routes of the M1 and M18, are often restricted by roadside vegetation, localised sections of cuttings and the intervening landform. The A631 Bawtry Road and sections of the minor road network (including Penny Hill Lane, Brampton Lane and Lidget Lane) experience open views of the surrounding countryside from certain sections.
- 11.3.14 The most notable area of employment in the area is focused around Hellaby Industrial Estate at Hellaby, adjacent to the A631 Bawtry Road. Views from here tend to be restricted by large industrial warehouses in the area, and roadside planting associated with the M18 to the west. The larger settlements of Ulley, Wickersley, Bramley, Thurcroft and Aston (located in the Staveley to Aston area (LA11)) include centres of employment focused within the core of the settlements with surrounding built form often foreshortening outward views.

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

⁸⁵ 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

mitigated. Such effects are temporary and would vary over the construction period depending on the intensity and scale of the works at the time. The assessment of landscape and visual effects has been based on the activities occurring during the peak construction phase, which is defined as the period during which the main construction works would take place, including the presence of compounds, main earthworks and structure works.

- 11.4.2 The effects associated with the peak construction stage in this area are generally considered to be medium-term, based on the indicative construction programme in Section 2.3. It is currently anticipated that the peak civil engineering stage in this area would be undertaken between the end of 2025 and the start of 2030. Effects during other stages of works are likely to be less intensive due to less construction plant 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)⁸⁶ 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;
 - use of well-maintained hoardings and fencing;
 - prevention of damage to the landscape features adjacent to the construction sites due to movement of construction vehicles; and
 - designing lighting to avoid unnecessary intrusion onto adjacent buildings and other land uses.
- 11.4.5 Implementation of these measures has been taken into account in the assessment of the construction effects.

Assessment of temporary impacts and effects

- 11.4.6 The most apparent changes to the landscape and to the views experienced by visual receptors during construction would relate to the presence of construction plant, compounds and soils and material storage and stockpiling. Key construction activities that would give rise to the most apparent changes to landscape and visual receptors are: the excavation of cuttings; construction of viaducts; construction of embankments; temporary structures, site haul routes and construction compounds; construction activity associated with the removal of existing landscape elements including woodland, trees and hedgerows; a single wind turbine at Penny Hill Wind

⁸⁶ Supporting document: Draft Code of Construction Practice

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Farm; the closure and diversion of existing public highways and PRoW; the presence of construction plant; and the stockpiling of soils and materials. Other key changes include: the construction of overbridges and underbridges; an auto-transformer feeder station located at the M1 junction 32; a grid supply point south of the B6060 Morthen Road; overhead line equipment; utility diversions; the presence of transfer nodes and pre-cast yards; and the demolition of buildings and structures.

Landscape assessment

11.4.7 Based on the current design it is anticipated that the LCAs set out in Table 23 would be significantly affected during construction of the Proposed Scheme.

Table 23: Summary description and assessment of effects on LCAs

Ulley Enclosed Farmland LCA	Medium-high susceptibility and sensitivity
<p>Susceptibility to change: The more intimate character and rural qualities of the landscape have a medium -high susceptibility to change arising from the construction of the Proposed Scheme.</p> <p>Ulley Enclosed Farmland LCA would be directly affected by construction works associated with Hardwick cutting in the Staveley to Aston area (LA11), Ulley embankment, Thurcroft South viaduct, Penny Hill Lane Underbridge, site construction compounds, temporary material stockpiles and haul routes to the west of the Proposed Scheme. Construction activity associated with the removal of some areas of tree cover, hedgerows and farmland would result in changes to land cover with associated effects on the vegetation pattern and rural character. Earthworks and the introduction of temporary material stockpiles would introduce areas of disturbed ground and engineered landforms resulting in changes to the undulating local terrain and rural character. These effects would largely be focused within the eastern half of the LCA creating a large area of land with increased separation between the construction works and the M1 to the east. Due to the rising terrain and areas with elevated visibility to the west, the wider LCA would be affected by the presence of construction plant and movement of construction vehicles, which would alter the rural and tranquil qualities of the area.</p> <p>These changes would result in a high magnitude of change and a major adverse effect on the character of the landscape within this LCA during the construction phase.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>
Morthen Farmed and Wooded Slopes LCA	Medium susceptibility and sensitivity
<p>Susceptibility to change: The open character, contribution of the historic settlement and rural qualities of the landscape has a medium susceptibility to change arising from the construction of the Proposed Scheme.</p> <p>Morthen Farmed and Wooded Slopes LCA would be directly affected by construction works associated with Thurcroft South viaduct, Brampton-en-le-Morthen embankment, Thurcroft North viaduct, Springvale embankment, the B6060 Morthen Road overbridge, an auto-transformer feeder station and grid supply point, site construction compounds, temporary material stockpiles and haul routes to the west of the Proposed Scheme. These works would result in the removal of tree cover (including vegetation on the western side of the M18), hedgerows and farmland with the removal of tree cover alongside the M18 increasing the influence of this road over the LCA. Earthworks and stockpiles would introduce engineered landforms altering the terrain, which rises to the north and would have increased visibility of construction works throughout this LCA and its associated effects on the rural qualities of the landscape. The presence of construction plant, movement of construction vehicles and the construction of viaduct piers and spans would reduce the rural tranquillity of this LCA, which is already subject to effects associated with the M1 junction 32.</p> <p>These changes would result in a high magnitude of change and a major adverse effect on the character of the landscape within this LCA during the construction phase.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>

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Wickersley and Hellaby Unenclosed Farmland LCA	Medium susceptibility and sensitivity
<p>Susceptibility to change: The open character, rural qualities of the landscape and the influence existing infrastructure and surrounding settlements have on the landscape result in this LCA having a medium susceptibility to change arising from the construction of the Proposed Scheme.</p> <p>Wickersley and Hellaby Unenclosed Farmland LCA would be directly affected by construction works associated with Springvale cutting, King’s Pond Plantation embankment, Bramley South cutting, A631 Bramley South and North overbridges, site construction compounds, temporary material stockpiles and haul routes to the west of the Proposed Scheme. These works would result in the removal of tree cover (including vegetation on the western side of the M18 which would increase the influence of this road over the landscape), hedgerows and farmland. Earthworks and material stockpiles would introduce areas of disturbed ground and engineered landforms altering the rural qualities of the landscape and the undulating terrain, which rises towards the east and west of the LCA. The rising landform increases visibility of construction works throughout this LCA, which would include views from the eastern edge of the settlement of Wickersley, altering the role this landscape plays in providing a rural setting. The presence of construction plant and movement of construction vehicles would alter the rural qualities.</p> <p>These changes would therefore result in a medium magnitude of change and a moderate adverse effect.</p>	<p>Level of effect:</p> <p>Moderate adverse (significant)</p>
Bramley Fringe LCA	Medium susceptibility and sensitivity
<p>Susceptibility to change: The open character, level of tranquillity and rural qualities of the landscape results in a medium susceptibility to change arising from the construction of the Proposed Scheme.</p> <p>Bramley Fringe LCA would be directly affected by construction works associated with Bramley embankment, Bramley North cutting, Lidget Lane overbridge, Common Lane overbridge, site construction compounds, temporary material stockpiles and haul routes to the west of the Proposed Scheme. These works would result in the removal of mature hedgerow trees, hedgerows and farmland with associated effects on the vegetation pattern and rural character. Earthworks and stockpiles would introduce areas of disturbed ground and engineered landforms altering the rural qualities and the terrain, running against the grain of the landscape, which includes a ridge running from west to east through the centre of this LCA. The presence of construction plant and movement of construction vehicles would alter the qualities of the landscape, which play a role in providing a rural setting to Bramley.</p> <p>These changes would therefore result in a high magnitude of change and a major adverse effect.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>

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

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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 24 describes the construction phase potentially significant visual effects based on the current design of the Proposed Scheme. Viewpoint locations are shown in Map Series LV-03 in the Volume 2: LA12 Map Book.

Table 24: Construction phase potentially significant visual effects

<p>Views east from residences and PRoW at Ulley and PRoW to east and south-east of Ulley (VP 403-02-011 and 403-03-009) (Map Number LV-03-403b)</p>	<p>High and medium-high sensitivity receptors</p>
<p>Users of the PRoW network to the east and south-east of Ulley and residential properties on the eastern edge of this village, with more open views in this direction, would experience substantial changes in close to longer distance views. This would mainly be the result of construction activity associated with Ulley embankment and material stockpiles in this area. The presence of plant and the movement of construction vehicles, including vehicles along the haul route to the west of the Proposed Scheme, would add activity into these largely tranquil rural medium distance views. Construction works would alter rural characteristics of the view (changes to rolling landform, views of disturbed ground, changes to the rural vegetation pattern and perceptual qualities) and affect a large proportion of the view. There would therefore be a high magnitude of visual change and major adverse effect.</p>	<p>Level of effect: Major adverse (significant)</p>
<p>Views west from PRoW north of Vessey Close (VP 403-03-010 and 403-03-008) (Map Number LV-03-403b)</p>	<p>Medium-high sensitivity receptors</p>
<p>Users of the PRoW network to the north of Vessey Close Farm (Aston Bridleway 18) would experience substantial changes in medium distance views as a result of construction associated with Hardwick cutting (in the Staveley to Aston area), Ulley embankment and Thurcroft South viaduct. The slightly elevated viewing position would offer views of material stockpiles, and the presence of plant and the movement of construction vehicles would add activity into views, seen in the rural landscape to the west of the M1. Construction works would alter rural characteristics of the view (undulating landform, views of disturbed ground, removal of vegetation and associated effects on the perceptual qualities) and affect a large proportion of the view. Some night time lighting may be apparent associated with the viaduct construction.</p> <p>Similar close distance views, focused towards construction activity associated with Ulley embankment, would also be obtainable from the PRoW (Aston Footpath 19) to the west of the M1.</p> <p>There would therefore be a medium to high magnitude of visual change and moderate to major adverse effect.</p>	<p>Level of effect: VP403-03-010 Moderate adverse (significant) VP403-03-008 Major adverse (significant)</p>
<p>View west from residences at Brampton-en-le-Morthen (VP 404-02-004) (Map Number LV-03-404)</p>	<p>High sensitivity receptors</p>
<p>Residents with open views west from Brampton-en-le-Morthen would experience noticeable changes in medium distance views as a result of construction activity associated with Thurcroft South viaduct, Brampton-en-le-Morthen embankment and Thurcroft North viaduct. Works would include the removal of one turbine of the Penny Hill Wind Farm, seen in views to the south. The presence of taller construction plant, seen on the opposite side of the motorway embankment, would be apparent, affecting a notable proportion of the view. There would therefore be a medium magnitude of visual change and moderate adverse effect.</p>	<p>Level of effect: Moderate adverse (significant)</p>
<p>Views south-east from residences in Morthen and from the PRoW network to the south-east (VP 404-03-008 and 404-03-011) (Map Number LV-03-404)</p>	<p>High and medium-high sensitivity receptors</p>

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<p>Users of footpaths to the south-east of Morthen would experience substantial changes in near distance views. This would be a result of construction activity associated with Thurcroft South viaduct, Brampton-en-le-Morthen embankment, Thurcroft North viaduct and the Thurcroft auto-transformer feeder station located at the M1 junction 32. The presence of plant and the movement of construction vehicles would add activity into the largely rural view, albeit movement (and noise) associated with the motorway is already apparent. Changes to the landform, views of disturbed ground, removal of vegetation and the associated effects on the perceptual qualities would be apparent across much of the view. There would therefore be a high magnitude of visual change and major adverse effects on these sensitive receptors. A magnitude of change of medium is predicted for residents on the edge of Morthen (represented through 404-03-008). From here medium distance and more open views to the south-east looking over the M1 towards construction works within the M1 junction 32 are available. However, the level of effect would be similar, given the higher sensitivity of these receptors during construction.</p>	<p>Level of effect: Major adverse (significant)</p>
<p>Views east and south-east from residences and PRoW at Morthen and the B6060 Morthen Road (VP 404-03-009, 405-02-002 and 404-03-012) (Map Number LV-03-405)</p>	<p>High and medium-high sensitivity receptors</p>
<p>Users of the PRoW network to east of Morthen and residents to the north of the B6060 Morthen Road would experience substantial changes in close to medium distance views. This would be partly a result of construction activity associated with the Thurcroft North viaduct and Springvale embankment, seen in views to the south-east. However, construction activity in the more immediate foreground would include works associated with the grid supply point, auto-transformer feeder station and diversion of the B6060 Morthen Road, which incorporates an overbridge crossing the route of the Proposed Scheme. This would alter the undulating landform and introduce views of disturbed ground and vegetation clearance, with associated effects on perceptual qualities and affect a large proportion of the view. Views of Springvale embankment main compound, haul routes to the north-west of M1 junction 32 and the presence of plant and the movement of construction vehicles would be apparent in close distance views of rolling farmland with copses of woodland. There would therefore be a high magnitude of visual change and major adverse effect.</p>	<p>Level of effect: Major adverse (significant)</p>
<p>Views west from residences on Woodhouse Green/Brampton Road, Thurcroft (VP 405-02-001 and 404-02-013) (Map Number LV-03-405)</p>	<p>High sensitivity receptors</p>
<p>Residents on Woodhouse Green/Brampton Road would experience close distance views of construction works associated with the realignment of Kingsford Lane, which would link into the B6060 Morthen Road overbridge. The road realignment and overbridge would require the clearance of some mature trees to the west of the view, opening up glimpsed views towards the M18 and construction works associated with the Proposed Scheme, which runs on embankment to the west of this location. The presence of plant and the movement of construction vehicles would add activity into these suburban views. Residents would have close distance views from properties further south on Brampton Road, looking towards construction activity associated with Thurcroft North viaduct, and larger construction plant, seen to the west of the M18, particularly during the winter months when filtering by summer vegetation is reduced. There would therefore be a high magnitude of visual change and major adverse effect.</p>	<p>Level of effect: Major adverse (significant)</p>
<p>Views west from PRoW around Kingsford Field (VP 405-03-004) (Map Number LV-03-405)</p>	<p>Medium-high sensitivity receptors</p>
<p>Users of the PRoW network around Kingsford Field would experience noticeable changes in close distance views. This would be a result of construction works associated with Springvale cutting and King's Pond Plantation embankment, seen to the immediate west of the M18 from this slightly elevated vantage point. Construction activity would be apparent, including woodland clearance alongside the M18 and the construction of the Wickersley Footpath 9 Accommodation overbridge, which would be extended to cross the route of the Proposed Scheme. Temporary material stockpiles, as well as the presence of larger construction plant and the movement of construction vehicles, would add change into the rural landscape to the west of the M18 affecting much of the view in this direction. There would therefore be a medium magnitude of visual change and moderate adverse effect.</p>	<p>Level of effect: Moderate adverse (significant)</p>

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<p>Views east and south-east from residences and PRoW to south-east of Wickersley and south of Bramley (VP 405-03-008, 405-03-010, 406-03-004, 406-02-002 and 406-02-003) (Map Number LV-03-405 and 406)</p>	<p>High and medium-high sensitivity receptors</p>
<p>From viewpoints 405-03-008, 405-03-010 and 406-03-004, users of the PRoW network to the east and south-east of Wickersley would experience substantial changes in close to medium distance views. In medium distance views from the eastern edge of the settlement, construction activity associated with King's Pond Plantation embankment and Bramley South cutting would be apparent. This would be seen in the rural landscape, which falls in elevation towards the M18 and would include woodland clearance along the western side of the motorway. As footpath users travel south-east, closer distance views of construction works would be apparent, including material stockpiles and vehicle movements along the haul route that would run along the western side of the Proposed Scheme.</p> <p>From viewpoints 406-02-002 and 406-02-003 residents, including those on Sandy Lane, Westerton Drive and Sherborne Avenue, would experience close distance views of construction activity associated with Bramley South cutting, including localised roadside vegetation clearance. This localised vegetation removal would open up longer distance views of construction works to the south including temporary material stockpiles and Bramley South cutting satellite compound. There would therefore be a high magnitude of visual change and major adverse effect.</p>	<p>Level of effect: Major adverse (significant)</p>
<p>Views east and north-east from residences north-east of Bramley (VP 406-02-005 and 406-03-006) (Map Number LV-03-406)</p>	<p>High sensitivity receptors</p>
<p>Residents on the eastern edge of Bramley would experience substantial changes in close distance views as a result of construction activity associated with Bramley South cutting and Bramley embankment. Works would include the clearance of mature roadside vegetation, to the west of the M18, opening up views towards the motorway. Material stockpiles and site construction compounds would bring construction activity (including changes to the landform and views of vegetation clearance and disturbed ground) into the immediate foreground affecting a large proportion of the view, which currently consists of a strip of farmland separating the settlement from the motorway. The presence of plant and the movement of construction vehicles, including vehicles along the haul route on the western side of the Proposed Scheme, would add activity into views. There would therefore be a high magnitude of visual change and major adverse effect.</p>	<p>Level of effect: Major adverse (significant)</p>
<p>View west from residences on edge of Hellaby (VP 406-02-020) (Map Number LV-03-406)</p>	<p>High sensitivity receptors</p>
<p>Residents with open views west on the western edge of Hellaby would experience noticeable changes in medium distance views as a result of construction activity associated with Bramley retained cut and the cuttings either side of this feature. Works would include the clearance of mature trees, on the western side of the M18, opening up views to large scale commercial developments on the opposite side of the motorway. The presence of larger construction plant would be apparent, seen in close distance on the eastern side of the motorway, affecting much of the view in this direction. There would therefore be a medium magnitude of visual change and moderate adverse effect.</p>	<p>Level of effect: Moderate adverse (significant)</p>
<p>Views north-east from residences and the PRoW network to the north-east of Sunnyside (VP 407-04-018 and 407-03-020) (Map Number LV-03-407a)</p>	<p>High and medium-high sensitivity receptors</p>
<p>Residents on Braithwell Road (represented through 407-04-018) would experience noticeable changes in close distance views as a result of construction activity associated with Common Lane overbridge. Works would include the clearance of mature roadside trees to the east of the view, opening up framed views towards construction activity associated with Bramley North cutting. Longer distance and more open views, focused to the north looking along construction activity associated with Bramley North cutting, would be available from PRoW. The presence of plant and the movement of construction vehicles, including vehicles along the haul route to the west of the Proposed Scheme, would add activity into views and result in a substantial change in character to this largely rural view. Construction works would result in changes to undulating landform, views of vegetation clearance and views of disturbed ground. There would therefore be a medium increasing to high (in more open views to the north-east from the PRoW network) magnitude of visual change and moderate to major adverse effects.</p>	<p>Level of effect: Major adverse (significant)</p>

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View east from residences and PRoW at Ravenfield (VP 408-03-011 and 408-02-012) (Map Number LV-03-407a and 408)	High and medium-high sensitivity receptors
Users of PRoW to the east of Ravenfield, and residents with more open views in this direction, would experience noticeable change in long distance views as a result of construction activity associated with the Proposed Scheme, as it passes on a series of embankments and cuttings through the undulating farmed landscape to the east. Temporary material stockpiles, the presence of larger plant and the movement of construction vehicles would be apparent across a large proportion of this largely rural view. There would therefore be a medium magnitude of visual change and moderate adverse effect.	Level of effect: Moderate adverse (significant)

Other mitigation measures

- 11.4.12 To further reduce the significant effects described above, consideration will be given during the detailed design stage to where planting can be established early in the construction programme, including early planting in ecological mitigation sites, which would have the additional benefit of providing some visual screening. However, not all landscape and visual effects can be mitigated due to the visibility of construction activity and the sensitivity of surrounding receptors. No other mitigation measures are considered practicable during construction.

Summary of likely residual significant effects

- 11.4.13 The temporary residual significant effects during construction remain as described above. These effects would be temporary and reversible in nature lasting only for the duration of the construction works. These residual effects would generally arise from the widespread presence of construction activity and construction plant within the landscape and viewed by surrounding residents, and users of PRoW and main and local 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 landscape effects in relation to three LCAs;
 - moderate adverse landscape effects in relation to one LCA;
 - major adverse visual effects on views from six residential viewpoint locations;
 - major adverse visual effects on views from nine recreational viewpoint locations;
 - major adverse visual effects on views from one transport viewpoint location;
 - moderate adverse visual effects on views from four residential viewpoint locations; and
 - moderate adverse visual effects on views from five recreational viewpoint locations.

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 (including Ulley, Brampton-en-le-Morthen, Springvale, King's Pond Plantation and Bramley embankments) and cuttings into their wider landscape context and to mitigate views of structures and overhead line equipment from sensitive receptors, where reasonably practicable;
- compensatory woodland mitigation planting in areas of loss, using locally appropriate species composition and planting types including vegetation to the south of Bramley, to provide habitat connectivity, enhanced landscape connectivity, as well connectivity of historic landscape features, where reasonably practicable, and soften the visual impacts of embankments and viaduct abutments and help integrate them into the surrounding environment;
- hedgerow habitat creation and restoration in areas of loss to restore habitat 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; and
- provision of new areas of informal semi-natural greenspace at the intersection of the Proposed Scheme and the M18 (in the area between the M1 junction 32 as far north as Sandy Lane, to the south of Bramley) to provide new uses for areas of islanded landscape which are no longer viable for their original use and to compensate for loss of existing greenspace.

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 Thurcroft South and North viaducts, underbridges and overbridges, the presence of earthworks and the auto-transformer feeder station, grid supply point and auto-transformer station. Other aspects include the presence of overhead line equipment and the movement of trains.

Landscape assessment

11.5.4 Based on the current design, it is currently anticipated that the LCAs described in Table 25: would be significantly affected during operation of the Proposed Scheme.

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Table 25: Operational phase significant landscape effects

Ulley Enclosed Farmland	Medium-high susceptibility and Medium-high sensitivity
<p>Susceptibility to change: The more intimate character and rural qualities of the landscape have a medium-high susceptibility to change arising from the Proposed Scheme.</p> <p>Year 1: The LCA would be directly affected through effects associated with the increased separation of the landscape, changes to the landform, features and vegetation cover. The Proposed Scheme would enclose a wide strip of land between the route and the M1 to the east. Due to the undulating terrain, the Proposed Scheme would pass through the LCA in large sections of cutting (Hardwick cutting in the Staveley to Aston area), and on Ulley embankment to the east of Penny Hill Wind Farm, on the approach to the Thurcroft South viaduct. These new features would run against the natural contours of the landscape. The section of embankment would result in the loss of one of the turbines on the Penny Hill Wind Farm. The aesthetic qualities of the landscape would be altered by changes to land cover including the loss of arable farmland along with some low hedgerows and mature hedgerow trees and changes to the landscape pattern.</p> <p>These effects would largely be focused to the eastern half of the LCA. However, the wider LCA would be affected by the movement of operational trains (and associated noise), which would alter the rural character of the landscape further west.</p> <p>There would therefore be an overall high magnitude of change, as there would be a substantial alteration to the key characteristics of the area, which would result in a major adverse effect.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>
<p>Year 15: Whilst effects associated with the presence of the operational railway, changes to the landscape pattern and landform would remain, mitigation planting would provide partial integration and screening of structures into the landscape by the summer of year 15.</p> <p>The overall magnitude of change would therefore reduce to medium resulting in moderate adverse effects.</p>	<p>Level of effect:</p> <p>Moderate adverse (significant)</p>
Morthen Farmed and Wooded Slopes	Medium susceptibility and Medium sensitivity
<p>Susceptibility to change: The open character, contribution of the historic settlement and rural qualities of the landscape has a medium susceptibility to change arising from the Proposed Scheme.</p> <p>Year 1: The LCA would be directly affected through changes to the landform, changes to vegetation cover and the introduction of new and large scale engineered components, notably the Thurcroft South and North viaducts. The Proposed Scheme would run along the eastern boundary of this LCA, which is formed by the M18. Large embankments (Ulley embankment and Brampton-en-le-Morthen embankment) within and north of the M1 junction 32 would alter the landform and result in the loss of farmland, hedgerows and some tree cover, including mature planting on the western side of the M18 throughout this LCA.</p> <p>As the terrain generally rises to the north-west of the LCA, the aesthetic qualities and rural character of the landscape would be altered by the introduction of further infrastructure, into an area, which is already heavily influenced by transport infrastructure. A large compound that would house the auto-transformer feeder station within the land at M1 junction 32, and also the grid supply point to the south of the realigned B6060 Morthen Road overbridge, would introduce additional man-made features into this landscape.</p> <p>There would therefore be an overall medium magnitude of change and moderate adverse effect.</p>	<p>Level of effect:</p> <p>Moderate adverse (significant)</p>
<p>Year 15: As it matures, mitigation planting would provide some integration and screening of structures into the landscape by the summer of year 15. Planting and mitigation earthworks around the auto-transformer feeder station would increasingly combine to screen this feature by Year 15. However,</p>	<p>Level of effect:</p>

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<p>changes to the landscape pattern and landform, and views of the Thurcroft South and North viaducts, and associated effects on the rural landscape character, would remain.</p> <p>There would therefore be an overall medium magnitude of change and moderate effect.</p>	<p>Moderate adverse (significant)</p>
<p>Bramley Fringe</p>	<p>Medium susceptibility and Medium sensitivity</p>
<p>Susceptibility to change: The open character, level of tranquillity and rural qualities of the landscape has a medium susceptibility to change arising from the Proposed Scheme.</p> <p>Year 1: The LCA would be directly affected mainly through the increased separation of the landscape, changes to the landform, rural qualities, features and vegetation cover. The Proposed Scheme would enclose a large triangle of land between the route and the M18 further east, with resultant changes to landscape pattern and scale. Bramley North cutting located to the east of Spenwood Farm, along with smaller embankments and cuttings including Bramley embankment and Bramley Central cutting, would alter the local landform running against the natural contours of the landscape. The aesthetic qualities of the landscape would be altered by the loss of arable farmland, some low level hedgerows and mature hedgerow trees. The Proposed Scheme would also include overbridges at Lidget Lane and Common Lane, which would result in new engineered structures in this rural landscape.</p> <p>The changes would largely be focused to eastern half of the LCA, given the location of the route of the Proposed Scheme within this landscape. There would therefore be an overall high magnitude of change and major adverse effect.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>
<p>Year 15: Mitigation planting would assist with some screening and integration of structures into the landscape by the summer of year 15. However, effects associated with the movement of trains, increased separation of the landscape and changes to the landscape pattern and landform would remain.</p> <p>The magnitude of change would therefore reduce to medium resulting in a moderate effect.</p>	<p>Level of effect:</p> <p>Moderate adverse (significant)</p>

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 60 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 26 identifies the locations where the operation of the Proposed Scheme would potentially result in significant effects. Viewpoint locations are shown in Map Series LV-04 in the Volume 2: LA12 Map Book.

Table 26: Operational phase significant visual effects

<p>Views east from residences and PRoW at Ulley and PRoW to east and south-east of Ulley (Medium-high to high sensitivity receptors) (VPs 403-02-011 and 403-03-009) (Map Number LV-04-403b)</p>	
<p>Year 1 – winter and summer:</p> <p>At year 1, users of the PRoW network to the east and south-east of Ulley, and residential properties with more open views on the eastern edge of this village, would experience large-scale changes in close to</p>	<p>Level of effect:</p>

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<p>medium distance views as a result of the Proposed Scheme. The Ulley embankment, overhead line equipment and the movement of trains would be partially seen against the skyline and would result in a substantial alteration of key characteristics of the view. The proposed Ulley embankment would alter the landform and introduce a new feature that would extend across much of the existing views. The embankment would cross from north to south over the subtle valley around a small unnamed tributary that runs into Ulley Brook. The field pattern and boundaries would also change. The Proposed Scheme would introduce a strong linear feature that would break the irregular field pattern in this area.</p> <p>Mitigation planting would not provide any screening or landscape integration at this stage.</p> <p>The magnitude of change would therefore be high for both residents and footpath users and there would be a major adverse effect for highest sensitivity residential receptors.</p>	<p>Major adverse (significant)</p>
<p>Year 15 – summer:</p> <p>By the summer of year 15, views of Ulley embankment, overhead line equipment and the movement of trains would be partially screened and filtered by established mitigation planting. However, due to its proximity and scale, the Proposed Scheme would remain very apparent within closer distance views from the PRoW network to the east of Ulley.</p> <p>The magnitude of change would therefore remain high for both residents and footpath users and there would be a major adverse effect for highest sensitivity receptors.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>
<p>Views west from PRoW and Bridleway north of Vessey Close (Medium-high sensitivity receptors) (VPs 403-03-010 and 403-03-008) (Map Number LV-04-403b)</p>	
<p>Year 1 – winter and summer:</p> <p>At year 1, users of the PRoW network to the north of Vessey Close Farm would experience large-scale changes in medium distance views as a result of the Proposed Scheme. Sections of Hardwick cutting (in the Staveley to Aston area), Ulley embankment and Thurcroft South viaduct, overhead line equipment and the movement of trains would be seen to the west of the M18. The Proposed Scheme would extend across much of the existing view and would be partially seen against the horizon, consisting of rising farmland to the west of the motorway.</p> <p>The cuttings and embankments would alter the landform and change the vegetation pattern to the west of the M18. Whilst mature planting alongside and immediately east of the M18 would provide some partial screening of the Proposed Scheme, these screening effects would reduce in winter months. The Thurcroft South viaduct would add large scale engineered components into the view crossing over the M1 near a point where the existing motorway gantries and turbines of Penny Hill Wind Farm form notable features, seen above the horizon in the view.</p> <p>Similar close distance views, focused towards Ulley embankment, would also be obtainable from the PRoW (Aston Footpath 19) to the west of the M1.</p> <p>Mitigation planting would not provide any screening or landscape integration at this stage.</p> <p>The magnitude of change would therefore be medium for PRoW users and there would be a moderate adverse effect.</p>	<p>Level of effect:</p> <p>Moderate adverse (significant)</p>
<p>Year 15 – summer:</p> <p>Due to the maturing mitigation planting present in the view, effects would reduce to non-significant by year 15.</p>	<p>Level of effect:</p> <p>Non-significant</p>
<p>Views south-east from residences in Morthen and from the PRoW network to the south-east (Medium-high to High sensitivity receptors) (VPs 404-03-008 and 404-03-011) (Map Number LV-04-404)</p>	
<p>Year 1 – winter and summer:</p> <p>Users of footpaths to the south-east of Morthen would experience substantial changes in near distance views. This would be a result of Thurcroft South viaduct, Brampton-en-le-Morthen embankment, Thurcroft North viaduct and the auto-transformer feeder station. This would alter views of the largely rural landscape within the middle of the M1 junction 32 changing the landform (which rises to the east)</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>

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<p>and vegetation pattern (medium sized fields bounded by hedgerows with occasional trees) and introducing further engineered features, which would occupy a large part of the view. Mitigation planting would not provide any screening or landscape integration at this stage.</p> <p>It is anticipated that there would be potential for a high magnitude of visual change and major adverse effects on these sensitive receptors. The magnitude of change would reduce to medium, in medium distance and more open views to the south-east for residents on the edge of Morthen, looking over the M1. However, the level of effect would be similar, given the higher sensitivity of these receptors.</p>	
<p>Year 15 - summer:</p> <p>By the summer of year 15, views of the Proposed Scheme would be partially screened/filtered by established mitigation planting. However, due to its proximity and scale, the Proposed Scheme would remain very apparent within closer distance views, particularly for recreational users of the footpath network within the M1 junction 32.</p> <p>The magnitude of change would remain high for both residents and footpath users and there would be a major adverse effect.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>
<p>Views east and south-east from residences and PRow at Morthen and B6060 Morthen Road (Medium-high to High sensitivity receptors) (VPs 404-03-009, 405-02-002 and 404-03-012) (Map Number LV-04-405)</p>	
<p>Year 1 – winter and summer:</p> <p>At year 1, users of the PRow network to east of Morthen, and residential properties to the north of the B6060 Morthen Road, would experience large-scale changes in close to medium distance views as a result of the Proposed Scheme. Sections of the Thurcroft North viaduct and Springvale embankment would be apparent; however, the key change in the view would relate to close distance views of the grid supply point. Views would be apparent of the auto-transformer feeder station and diversion of the B6060 Morthen Road, which incorporates an overbridge crossing the route. Both the grid supply point and auto-transformer feeder station would introduce large new features into the view of undulating farmland, which falls towards the M18. The B6060 Morthen Road overbridge and its associated embankments would substantially alter the landform and key characteristics of the view for residential properties to the north of the B6060 Morthen Road, who currently look over open, undulating arable fields. Mitigation planting would not provide any screening or landscape integration at this stage.</p> <p>The magnitude of change would therefore be high for both residents and footpath users and there would be a major adverse effect for highest sensitivity receptors.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>
<p>Year 15 – summer:</p> <p>By the summer of year 15, views of the auto-transformer feeder station, grid supply point and the B6060 Morthen Road overbridge would be partially screened/filtered by established mitigation planting. Views of the wider Proposed Scheme further south-east would also be partially screened, although mitigation planting along the route would do little to screen sections of the Thurcroft North viaduct. Due to its proximity and scale, the Proposed Scheme would remain very apparent within closer distance views, particularly for residents to the north of the B6060 Morthen Road.</p> <p>The magnitude of change would remain high for both residents and footpath users and there would be a major adverse effect.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>
<p>Views west from residences on Woodhouse Green/ Brampton Road, Thurcroft (High sensitivity receptors) (VPs 405-02-001) (Map Number LV-04-405)</p>	
<p>Year 1 – winter and summer:</p> <p>At year 1, residential properties on Woodhouse Green Brampton Road would experience close distance views of works associated with the realignment of Kingsforth Lane, which would link into the B6060 Morthen Road overbridge. The road realignment and overbridge would pass through a line of mature trees, resulting in the loss of some trees to the west, opening up glimpsed views towards the M18 and the</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>

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<p>route of the Proposed Scheme, which runs on embankment to the west of this location. Mitigation planting would not provide any screening or landscape integration at this stage.</p> <p>The magnitude of change would therefore be high for residents and there would be a major adverse effect.</p>	
<p>Year 15 – summer:</p> <p>By the summer of year 15, views of the Kingsford Lane realignment, which would link into the B6060 Morthen Road overbridge, would remain open due to the alignment of the road/overbridge. Due to its proximity and scale, the Proposed Scheme would remain a substantial change in the view.</p> <p>The magnitude of change would remain high for residents and there would be a major adverse effect.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>
<p>Views west from PRow around Kingsford Field (Medium-high sensitivity receptors) (VPs 405-03-004) (Map Number LV-04-405)</p>	
<p>Year 1 – winter and summer:</p> <p>At year 1, users of the PRow network around Kingsford Field would experience noticeable changes in close distance views as a result of the Proposed Scheme. Changes would principally relate to views of the Springvale cutting and King’s Pond Plantation embankment, seen to the immediate west of the M18 from a slightly elevated vantage point, back dropped by the more immediate rising farmed landscape behind.</p> <p>The cuttings and embankments would alter the landform and change the vegetation pattern to the west of the M18. This would include the loss of a mature belt of vegetation on the western side of the M18, which would open up potential views of the Proposed Scheme, crossing a large part of the available view. Views would be apparent of the Wickersley Footpath 8b and 9 Accommodation overbridge, which would be extended to cross the Proposed Scheme.</p> <p>Mitigation planting would not provide any screening or landscape integration at this stage.</p> <p>The magnitude of change would therefore be medium for footpath users and there would be a moderate adverse effect.</p>	<p>Level of effect:</p> <p>Moderate adverse (significant)</p>
<p>Year 15 – summer:</p> <p>Due to the maturing mitigation planting present in the view, effects would reduce to non-significant by year 15.</p>	<p>Level of effect:</p> <p>Non-significant</p>
<p>Views east and south-east from residences and PRow to south-east of Wickersley (Medium-high to high sensitivity receptors) (VPs 405-03-008, 405-03-010, 406-03-004, 406-02-002 and 406-02-003) (Map Number LV-04-405 and 406)</p>	
<p>Year 1 – winter and summer:</p> <p>At year 1, users of the PRow network to the east and south-east of Wickersley would experience large-scale changes in close to medium distance views as a result of the Proposed Scheme. In longer distance views from the settlement edge to the west, the King’s Pond Plantation embankment and Bramley South cutting would alter the undulating terrain, which falls towards the M18, and introduce a new feature that would extend across a large part of the existing view. There would be a loss in mature vegetation, including planting along the western side of the M18. This would open up views of the M18, which would be seen in proximity to the Proposed Scheme.</p> <p>In closer distance views, including from Sandy Lane and residences of Westerton Drive and Sherborne Avenue, the localised loss of vegetation cover would open up views looking east over the Bramley South cutting. Views of large-scale changes to the landform to the south and more open views of the M18 would also be gained.</p> <p>Mitigation planting would not provide any screening or landscape integration at this stage.</p> <p>The magnitude of change would therefore range from medium to high for both residents and PRow users and there would be major adverse effects for the highest sensitivity receptors.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>
<p>Year 15 – summer:</p>	<p>Level of effect:</p>

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<p>By the summer of year 15, views of King's Pond Plantation embankment, Bramley South cutting, overhead line equipment and the movement of trains would be partially screened and filtered by established mitigation planting. Established mitigation planting would be most effective on the sections of embankment, where it would provide screening and help integrate the Proposed Scheme with the surrounding landscape. Furthermore, established localised screening for residents of Westerton Drive and Sherborne Avenue would help to reduce visibility to the east and south and the associated magnitude of change.</p> <p>The magnitude of change would generally reduce so that effects would be below the threshold of significant. However, a medium magnitude of change is predicted from viewpoint 405-03-008, from the PRoW along Second Lane and in closer distance views where changes to the landform associated with King's Pond Plantation embankment would continue to result in significant effects.</p>	<p>Moderate adverse (significant) from Viewpoint 405-03-008</p>
<p>Views north-east from residences north-east of Bramley (High sensitivity receptors) (VPs 406-02-005 and 406-03-006) (Map Number LV-04-406)</p>	
<p>Year 1 – winter and summer:</p> <p>At year 1, residential properties on the eastern edge of Bramley, with more open views where garden vegetation allows, would experience large-scale changes in close distance views as a result of the Proposed Scheme. The Bramley South cutting and Bramley embankment would alter the landform and vegetation pattern in views to the east and north-east. Close distance views looking over the northern end of the Bramley South cutting towards Bramley embankment would replace views of a strip of pastoral farmland, which separates this settlement from the M18. The loss of mature roadside vegetation, to the west of the M18, would also open up views of the motorway.</p> <p>Mitigation planting would not provide any screening or landscape integration at this stage.</p> <p>The magnitude of change would therefore be high for residents and there would be major adverse effects.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>
<p>Year 15 – summer:</p> <p>By the summer of year 15, established mitigation planting would provide some filtering of views. However, due to the proximity and scale of the Proposed Scheme and limited space to establish a wider band of mitigation planting, closer distance views looking across Bramley South cutting towards Bramley embankment would continue to affect certain locations.</p> <p>The magnitude of change would remain high for residents and there would be a major adverse effect.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>
<p>Views north-east from residences north-east of Sunnyside (High sensitivity receptors) (VPs 407-04-018) (Map Number LV-04-407a)</p>	
<p>Year 1 – winter and summer:</p> <p>At year 1, residential properties on Braithwell Road (represented through 407-04-018) would experience close distance views of the Common Lane overbridge. The overbridge would result in the loss of mature roadside trees to the east of view, opening up framed views towards the Proposed Scheme, which would run through a cutting.</p> <p>Mitigation planting would not provide any screening or landscape integration at this stage.</p> <p>The magnitude of change would therefore be medium for residents and there would be a moderate adverse effect.</p>	<p>Level of effect:</p> <p>Moderate adverse (significant)</p>
<p>Year 15 – summer:</p> <p>Due to the maturing mitigation planting present in the view, effects would reduce to non-significant by year 15.</p>	<p>Level of effect:</p> <p>Non-significant</p>

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:

- moderate adverse landscape effects in relation to three LCAs;
- major adverse visual effects on views from four residential viewpoint locations;
- major adverse visual effects on views from six recreational viewpoint locations; and
- moderate adverse visual effects on views from one recreational viewpoint location.

Monitoring

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

There are no area specific requirements for monitoring landscape and visual mitigation during the operation of the Proposed Scheme in the Ulley to Bramley 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 Ulley to Bramley area. The assessment considers existing businesses, community organisations, local employment and local economies, including planned growth and development.
- 12.1.2 Engagement with Rotherham Metropolitan Borough Council (RMBC) 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: LA12 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, Introduction and Methodology (Section 8) and the Scope and Methodology Report (SMR)⁸⁷.
- 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.
- 12.2.3 Businesses may experience significant isolation effects as a result of the Proposed Scheme. Likely significant isolation effects will be reported in the formal ES.

12.3 Environmental baseline

Existing baseline

Study area description

- 12.3.1 The following provides a brief overview of employment, economic structure, labour market and business premises availability within the Ulley to Bramley area. It lies within the administrative area of RMBC. It also falls entirely within the Sheffield City

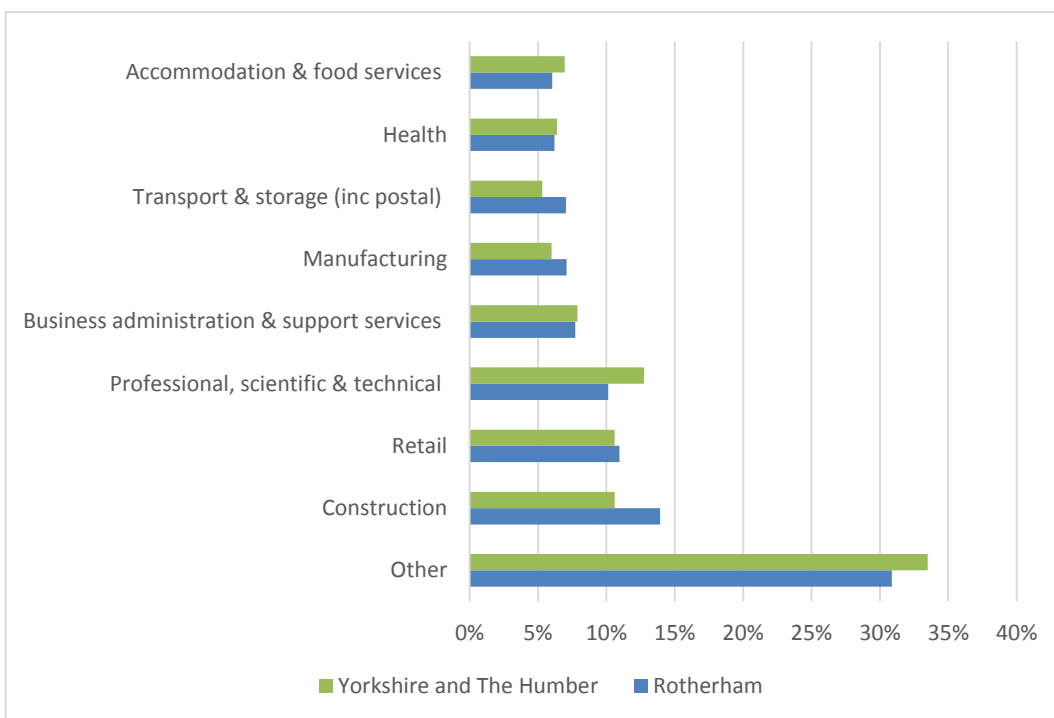
⁸⁷ Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

Region Local Enterprise Partnership (LEP) area⁸⁸ and the Yorkshire and Humber region.

Business and labour market

12.3.2 Within the RMBC area, construction accounts for the largest proportion of businesses (14%) with retail (11%) and professional, scientific and technical (10%) sectors also accounting for relatively large numbers of businesses within the borough. This is shown below in Figure 8. For comparison, within the Yorkshire and the Humber region, professional, scientific and technical sector (13%) accounts for the largest number of businesses with retail (11%) and construction (11%) also accounting for relatively large numbers of businesses⁸⁹.

Figure 8: Business sector composition in the RMBC area and the Yorkshire and the Humber Region⁹⁰



12.3.3 In 2016, approximately, 107,000 people worked in the RMBC area⁹¹ according to the Office for National Statistics Business Register and Employment Survey 2016. The top five sectors in terms of share of employment in the RMBC area were: health (16%); manufacturing (11%); business administration and support services (11%); retail (9%) and education (9%). These compare with the top five sectors for the Yorkshire and the Humber region, which were: health (14%); manufacturing (10%); education (10%);

⁸⁸ Sheffield City Region Local Enterprise Partnership, (2014), *Strategic Economic Plan: A Focussed 10 Year Plan for Private Sector Growth 2015-2025*; <https://sheffieldcityregion.org.uk/wp-content/uploads/2018/01/SCR-Growth-Plan-March-2014-1.pdf>

⁸⁹ Office for National Statistics, (2017), UK Business count –Local Units 2017. Available online at <https://www.nomisweb.co.uk>

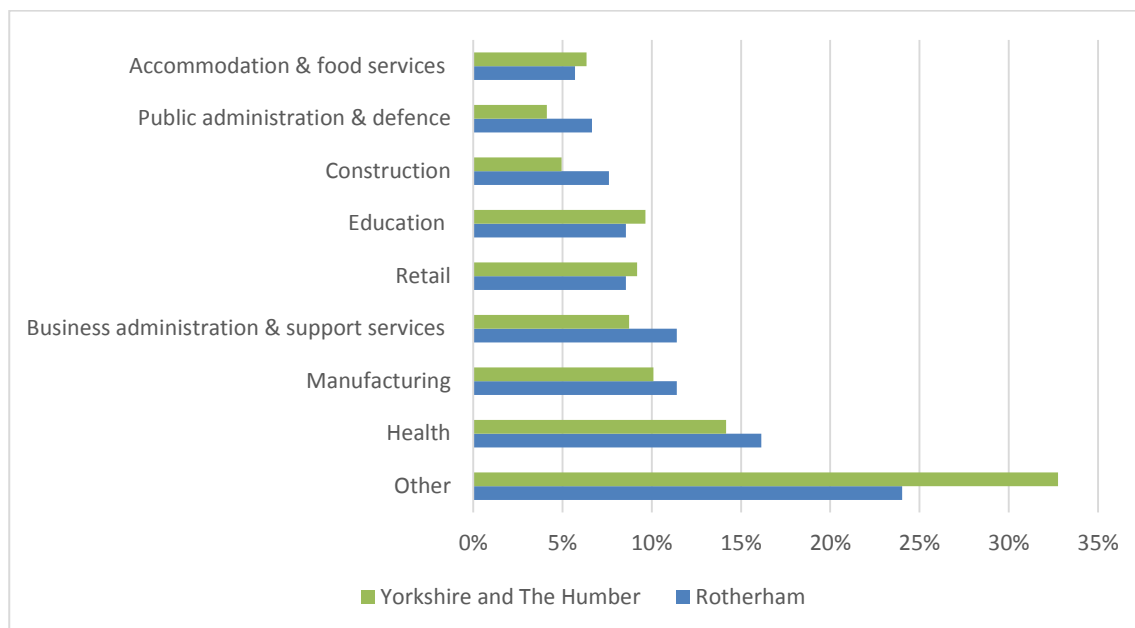
⁹⁰ 'Other' includes: Arts, entertainment, recreation and other services; Wholesale; Information and communication; Motor trades; Education; Public administration and defence; Property, Financial and insurance; Agriculture, forestry and fishing; and Mining, quarrying and utilities

⁹¹ Office for National Statistics (2017), Business Register and Employment Survey 2016, ONS, London - this number includes both residents and non-residents who work within the local authority boundaries

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retail (9%); and business administration and support services (9%). These data are shown in Figure 9⁹².

Figure 9: Employment by industrial sector in the RMBC area and the Yorkshire and the Humber Region⁹³



12.3.4 According to the Annual Population Survey (2016)⁹⁴, the employment rate⁹⁵ within the RMBC area was 67% (106,000 people), which is lower than that recorded for both the Yorkshire and the Humber region (72%) and England (74%). In 2016, unemployment⁹⁶ in the RMBC area was 7%, which was higher than both Yorkshire and the Humber and England, which were both 5%.

12.3.5 According to the Annual Population Survey (2016)⁹⁷, 25% of RMBC residents aged 16-64 were qualified to National Vocational Qualification Level 4 (NVQ4) and above, compared to 31% in the Yorkshire and Humber region and 38% in England. The Survey also shows 12% of residents had no qualifications, which was higher than that recorded both for the Yorkshire and the Humber region (10%) and England (8%).

Property

12.3.6 A review of employment land in 2015 identified a need for 235ha to be supplied over the period 2015-2028 for general business land in the RMBC area. The latest evidence

⁹² Office for National Statistics; (2015); Business Register and Employment Survey; Available online at <http://www.nomisweb.co.uk>. - this number includes both residents and non-residents who work within the local authority boundaries

⁹³ 'Other' includes: Transport and storage (inc postal); Arts, entertainment, recreation and other services; Wholesale; Professional, scientific and technical; Motor trades; Information and communication; Mining, quarrying and utilities; Financial and insurance; Property; and Agriculture, forestry and fishing

⁹⁴ Annual Population Survey, (2016), NOMIS; Available online at: <http://www.nomisweb.co.uk>

⁹⁵ The proportion of working age (16-64 year olds) residents that is in employment

⁹⁶ 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.

⁹⁷ Annual Population Survey, (2016), NOMIS. Available online at: <http://www.nomisweb.co.uk>

has concluded that the RMBC area has an employment land supply of 260ha which is greater than projected need⁹⁸.

- 12.3.7 The average vacancy rate for industrial and warehousing property in the RMBC area in December 2017 has been assessed as 14% based on marketed space compared against known stock⁹⁹.

12.4 Effects arising during construction

Avoidance and mitigation measures

- 12.4.1 The draft Code of Construction Practice (CoCP)¹⁰⁰ 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 of the draft CoCP);
- 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 and visual impacts) and isolation of an area, which could affect business

⁹⁸ Sheffield City Council and Rotherham Metropolitan Borough Council, (2015), *Sheffield and Rotherham Joint Employment Land Review*; Available online at http://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=0ahUKewi3od3Zhv7XAhXiAsAKHVtJAQIQFggYMAI&url=http%3A%2F%2Fwww.rotherham.gov.uk%2Fdownload%2Fdownloads%2Fid%2F2705%2Fsheffield_and_rotherham_employment_land_review_2015.pdf&usq=AOvVaw1K3kev-ghyjDC1xtMF-Wdj

⁹⁹ 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)

¹⁰⁰ Supporting document: Draft Code of Construction Practice

operations, both will be reported in the formal ES. Any resulting effects on employment will be reported at a route-wide level (see Volume 3: Route-wide effects); and

- potential employment opportunities arising from construction in the local area (including in adjacent community areas).

Temporary effects

In-combination effects

- 12.4.3 Businesses within the Ulley to Bramley area may experience air quality, noise and vibration or construction traffic impacts as a result of construction of the Proposed Scheme. Taken in combination, the residual effects from these other topic assessments may amount to a significant change in the environment. In-combination effects will be reported in the formal ES.

Isolation

- 12.4.4 Non-agricultural businesses may experience significant isolation effects as a result of the Proposed Scheme in the Ulley to Bramley area. Isolation effects will be reported in the formal ES.

Construction employment

- 12.4.5 It is currently expected that there would be one main construction compound at Springvale Embankment and seven satellite compounds in the Ulley to Bramley area. These compounds could result in the creation of up to 1,150 person years of construction employment opportunities¹⁰¹, broadly equivalent to 120 full-time jobs¹⁰², 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 that would occur has been considered as part of the route-wide assessment (see Volume 3: Route-wide effects).
- 12.4.6 Direct construction employment could also lead to opportunities for local businesses to supply the project or to benefit from expenditure of construction workers, including around areas where worker accommodation is provided along the construction of the Proposed Scheme. The impact of the indirect construction employment creation that would occur has been considered as part of the route-wide assessment (see Volume 3: Route-wide effects).
- 12.4.7 The resulting effects on employment that would occur are reported in aggregate at a route-wide level (see Volume 3: Route-wide effects).

Permanent effects

Businesses

- 12.4.8 Businesses directly affected, comprising those that lie within land required for the Proposed Scheme, are reported in groups, where possible, to form defined resources

¹⁰¹ 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

¹⁰² Based on the convention that 10 employment years is equivalent to one full time equivalent job

based on their location and operational characteristics. A group could contain either one or a number of businesses reflecting the fact that a building may have more than one occupier or that similar businesses and resources are clustered together.

- 12.4.9 Two business accommodation units each involved in warehousing activities in the study area, would experience direct impacts as a result of the Proposed Scheme. These units form a single resource located on land immediately to the south of the Best Western Consort Hotel off the Brampton Road.
- 12.4.10 It is currently expected that no businesses in the area would experience significant permanent direct effects as a result of land required by the Proposed Scheme. Across the employment areas reviewed, it is currently anticipated that an estimated 10 jobs¹⁰³ would either be displaced or possibly lost within the Ulley to Bramley 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 more 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 RMBC (approximately 107,000 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 line of route 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.

¹⁰³ 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 during operation of the Proposed Scheme are proposed in relation to business resources.

Assessment of impacts and effects

Resources with direct effects

- 12.5.2 It is currently expected that no resources would experience significant direct socio-economic effects during the operation of the Proposed Scheme.

In-combination effects

- 12.5.3 In-combination effects will be assessed and reported in the formal ES.

Operational employment

- 12.5.4 Direct operational employment created by the Proposed Scheme could lead to indirect employment opportunities for local businesses in terms of potentially supplying the Proposed Scheme or benefiting from expenditure of directly employed workers on goods and services.

- 12.5.5 The impact of operational employment creation will be assessed and reported at a route-wide level in Volume 3: Route-wide effects.

Other mitigation measures

- 12.5.6 No mitigation measures are proposed in relation to business resources during operation of the Proposed Scheme.

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, Introduction and Methodology, 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 Ulley to Bramley 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 Ulley to Bramley 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 areas¹⁰⁴; and
- 'non-residential receptors'¹⁰⁵ such as:
 - community facilities including schools, hospitals, places of worship and 'quiet areas'¹⁰⁶; 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 policy¹⁰⁷, planning policy, planning practice guidance on noise (PPGN)¹⁰⁸ and EIA Regulations as described in the Scope and Methodology Report¹⁰⁹ (SMR).

13.1.3 Engagement has been undertaken with Rotherham Metropolitan Borough Council (RMBC) 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 Ulley to Bramley area showing the location of the key environmental features (Map Series CT-10), key construction features (Map Series CT-05), key operational features (Map Series CT-06) and operational sound, noise and/or vibration impacts and proposed noise mitigation (Map series SV-01), can be found in the Volume 2: LA12 Map Book. Map series SV-01 also presents key 'non-

¹⁰⁴ '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.

¹⁰⁵ 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

¹⁰⁶ '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.

¹⁰⁷ Noise Policy Statement for England, (2015) Department for Environment, Food and Rural Affairs (Defra)

¹⁰⁸ Department for Communities and Local Government (DCLG) (2014), Planning Practice Guidance – Noise. Available online at:

<https://www.gov.uk/guidance/noise--2>

¹⁰⁹ Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

residential receptors'. These receptors will be reviewed and developed further to incorporate, where appropriate, consultation feedback and ongoing stakeholder engagement.

- 13.1.5 The assessment of noise and vibration likely significant effects on agricultural, heritage and ecological receptors and the assessment of tranquillity is ongoing and will be reported in the formal ES.

13.2 Scope, assumptions and limitations

- 13.2.1 The approach to assessing sound, noise and vibration and identifying envisaged mitigation is outlined in Volume 1 (Section 8 and Section 9) and the SMR.
- 13.2.2 In this assessment 'sound' is used to describe the acoustic conditions that people experience as a part of their everyday lives. Noise is taken as unwanted sound and hence adverse effects are noise effects and mitigation is, for example, by noise barriers.
- 13.2.3 Effects can either be temporary from construction or permanent from the operation of the Proposed Scheme. These effects may be direct, resulting from the construction or operation of the Proposed Scheme, and/or indirect, resulting from changes in traffic patterns on existing roads or railways that result from the construction or operation of the Proposed Scheme.
- 13.2.4 The effects of construction noise and vibration are assessed qualitatively, based on construction compound locations, construction routes, initial construction estimates and professional judgement. No quantitative assessment has been undertaken for the construction of the Proposed Scheme at this stage. The quantitative assessment will be reported in the formal ES.
- 13.2.5 The effects on operational noise and vibration are assessed quantitatively based on forecast noise emission from the Proposed Scheme combined with outline baseline information and professional judgement. As baseline information is limited at this stage the quantitative assessment including a full baseline will be reported in the formal ES.

13.3 Environmental baseline

- 13.3.1 The SMR describes the three rounds of baseline data collection covering existing sources, modelling and by targeted monitoring. Baseline sound levels will be published in the formal ES.
- 13.3.2 The area is characterised by a mixture of large towns, villages, hamlets and isolated residential properties in a predominantly rural setting. 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 several main roads within the Ulley to Bramley area that contribute to the sound environment including: the M1 and the M18, including their intersection; and the A631 that connects Rotherham, Wickersley and Maltby to the M18 junction 1.

- 13.3.4 Sound levels close to these main transportation routes are high during the daytime, but are 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 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 noise 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 Agglomerations¹¹⁰, Roads¹¹¹ or Railways¹¹². HS2 Ltd will engage with the Competent Authorities responsible for the relevant Important Areas. Map Series SV-01 (Volume 2: LA12 Map Book) shows any noise Important Areas in the Ulley to Bramley area.

13.4 Effects arising during construction

Assumptions and limitations

- 13.4.1 The construction activities 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)¹¹³. 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 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.

Avoidance and mitigation measures

- 13.4.3 The assessment assumes the implementation of the principles and management processes set out in the noise and vibration section of the draft CoCP¹¹⁴ (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 receptors¹¹⁵;
 - As part of BPM, mitigation measures are applied in the following order:

¹¹⁰ Noise Action Plan: Agglomerations (large urban areas) (2014) Department for Environment, Food and Rural Affairs

¹¹¹ Noise Action Plan: Roads (including major roads) (2014) Department for Environment, Food and Rural Affairs

¹¹² Noise Action Plan: Railways (including major railways) (2014) Department for Environment, Food and Rural Affairs

¹¹³ Supporting document: Draft Code of Construction Practice

¹¹⁴ Additional Documents: HS2 Phase 2b: Crewe to Manchester and West Midlands to Leeds Environmental Impact Assessment, Draft Code of Construction Practice

¹¹⁵ Including local businesses and quiet areas designated by the local authority

- 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 will set out BPM measures to minimise construction noise and vibration, including control of working hours, and provide a further assessment of construction noise and vibration, including confirmation of noise insulation/temporary re-housing provision;
 - Contractors would undertake and report such monitoring as is necessary to assure and demonstrate compliance with all noise and vibration commitments. Monitoring data would be provided regularly to, and be reviewed by, the nominated undertaker and made available to the local authorities; and
 - Contractors would be required to comply with the terms of the CoCP and appropriate action would be taken by the nominated undertaker as required to ensure compliance.

13.4.4 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.

13.4.5 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

13.4.6 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: LA12 Map Book):

- Brampton-en-le-Morthen, arising from construction activities such as embankment formation and landscape bund construction;

- Thurcroft, arising from construction activities such as demolition, use of transfer node, cutting formation, embankment formation, road realignment, balancing pond construction and landscape bund construction;
- Bramley, arising from construction activities such as cutting formation, embankment formation, overbridge construction, retaining walls construction, road realignment, balancing pond construction, ecological pond construction and landscape bund construction;
- Hellaby, arising from construction activities such as cutting formation, embankment formation, road realignment and landscape bund construction; and
- Ravenfield Common, arising from construction activities such as cutting formation, overbridge construction and landscape bund construction.

13.4.7 Map Series SV01 (Volume 2: LA12 Map Book) shows key non-residential properties that have been identified within the study area. Of these, the following are most likely to experience significant effects (to be confirmed in the formal ES):

- Best Western Consort Hotel in Thurcroft;
- Restover Lodge Hotel, Hellaby; and
- Hotel Ibis Rotherham East, Bramley.

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

13.4.9 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:

- Long Road and Penny Hill Lane, between Common Road and the M1;
- Katherine Road and Brampton Road between the Proposed Scheme on Brampton Road and the junction of Katherine Road and Green Arbour Road;
- the B6060 Green Arbour Road and the B6060 Woodhouse Green between the junction of the B6060 Green Arbour Road and Laughton Common Road and the Proposed Scheme on the B6060 Woodhouse Green;
- the B6060 Morthen Road between the Proposed Scheme on the B6060 Morthen Road and the A631 Worrygoose Roundabout;
- Cumwell Lane between A631 Bawtry Road and Kingsforth Lane; and
- Sandy Lane and Flash Lane between Cumwell Lane and A631 Bawtry Road.

13.4.10 The magnitude and extent of any effect would depend on the level of construction traffic using the road. Any residual significant temporary noise or vibration effects will be reported in the formal ES.

Other mitigation measures

- 13.4.11 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

- 13.4.12 Further work is being undertaken to confirm significant construction noise and vibration effects, including any temporary indirect effects from construction traffic.
- 13.4.13 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. Any likely significant effects will be reported in the formal ES.

13.5 Effects arising from operation

Assumptions and limitations

Local assumptions

- 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 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 Ulley to Bramley 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 would progressively increase to nine trains per hour in each direction on the main lines with an operating speed of 330kph for 90% of services and 360kph for 10% of services. This number of services is assumed to operate every hour from 07:00 to 21:00. The number of services would progressively decrease after 21:00 and the last service would arrive at terminal stations by midnight. Further information is presented in Volume 1 (Section 4).

Avoidance and mitigation measures

- 13.5.3 The development of the Proposed Scheme alignment has sought to reduce noise impact insofar as reasonably practicable.
- 13.5.4 Envisaged avoidance and mitigation measures that apply route-wide are described in Volume 1 (Section 9).

Airborne noise

- 13.5.5 Through the procurement process for the trains and the track, the use of proven international technology would enable the railway to be quieter than implied by current minimum European standards. Details of operational train noise 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 standards¹¹⁶.

- 13.5.6 The Proposed Scheme would incorporate noise barriers to avoid or reduce significant adverse airborne noise effects. The assessment has been based on the assumption that noise fence barriers are acoustically absorbent on the railway side and are located 5m from the outer rail. The envisaged noise barrier locations based upon the currently available information are shown on Map Series SV-01 (Volume 2: LA12 Map Book) and described in Section 2.2.
- 13.5.7 In practice, barriers may differ from this description while maintaining the required acoustic performance. For example, where noise barriers are in the form of landscape earthworks, they would need to be higher above rail level to achieve similar noise attenuation to the noise fence barrier because the crest of the earthwork would be further than 5m from the outer rail.
- 13.5.8 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.
- 13.5.9 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 discretionary criteria, to provide the same mitigation as defined in 'the NI Regulations' at residential buildings where¹¹⁷ 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 Europe¹¹⁸ or the maximum noise level criteria¹¹⁹ 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

- 13.5.10 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

- 13.5.11 Map Series SV-01 (Volume 2: LA12 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

¹¹⁶ Technical Specification for Interoperability (TSI) Noise – EU Commission Regulation No 1304/2014

¹¹⁷ Following Government's National Planning Practice Guidance <https://www.gov.uk/government/collections/planning-practice-guidance>

¹¹⁸ World Health Organization (2010), *Night time Noise Guidelines for Europe*

¹¹⁹ Dependent on the number of train passes

sound level. The 50dB contour, therefore, indicates the distance from the Proposed Scheme at which the night time noise level would be 40dB. This contour represents where adverse noise effects may start to be observed during the day (with respect to annoyance) and night (with respect to sleep disturbance). With regard to sleep disturbance the assessment also takes account of the maximum noise levels generated by each train pass by as defined in the SMR.

- 13.5.12 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.
- 13.5.13 A summary of the likely significant effects identified on a precautionary basis is presented at the end of this section.
- 13.5.14 Likely significant airborne noise effects arising from permanent changes to existing roads, will be reported in the formal ES.

Other mitigation measures

- 13.5.15 Further work is being undertaken to confirm the extent, location and type of the noise mitigation to be included within the Proposed Scheme, which will be reported in the formal ES.

Summary of likely residual significant effects

- 13.5.16 Mitigation, including landscape earthworks and noise fence barriers, described in Volume 1 (Section 9), section 2.2 and presented in Map Series SV-01 (Volume 2: LA12 Map Book) and Map Series CT-06 (Volume 2: LA12 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.
- 13.5.17 Taking account of the avoidance and mitigation measures this initial assessment has identified effects on a precautionary basis with the potential to be considered significant on a community basis due to increased airborne noise levels in line with the SMR at or around:
- Bramley: occupants of residential properties on Westerton Drive, Nascot Close and Sherbourne Avenue, located closest to the Proposed Scheme, identified by LA12-C01 on Map SV-01-387; and
 - Ravenfield Common: occupants of residential properties on Common Lane, Braithwell Road, Gorse Close, Parkin Close and Bridgewater Way, located closest to the Proposed Scheme, identified by LA12-C02 on Map SV-01-387.
- 13.5.18 The envisaged mitigation (especially track design) would substantially reduce the potential ground-borne noise and vibration effects that would otherwise arise from the Proposed Scheme. Nonetheless, this initial assessment has identified a potential likely significant effect on a community basis due to ground-borne vibration on

occupants of residential properties on Westerton Drive and Sherbourne Avenue in Bramley, located closest to the Proposed Scheme, identified by LA12-Co1 on Map SV-01-387. This potential community significant ground-borne vibration effect is considered in combination with the effect due to increased airborne noise level also identified at this location. Further assessment will be undertaken for the formal ES.

The initial assessment indicates that, the forecast noise from long-term railway operation may exceed the daytime threshold set by the Noise Insulation Regulations, the night-time Interim Target identified in the WHO Night Noise Guidelines for Europe 2009 or the maximum noise levels criteria set out in the SMR, at individual residential properties closest to the Proposed Scheme in:

- Wickersley in the vicinity of the B6060 Morthen Road and Green Lane (identified on Map SV-01-386 in Volume 2: LA12 Map Book);
- Slacks Farm in the vicinity of Slacks Lane (identified on Map SV-01-386 in Volume 2: LA12 Map Book); and
- Bramley in the vicinity of Sandy Lane/M18 (identified on Map SV-01-387 in Volume 2: LA12 Map Book).

- 13.5.19 The initial assessment indicates that there are no significant effects identified at any non-residential receptors in the Ulley to Bramley area as a result of operational noise.
- 13.5.20 Further assessment work is being undertaken to identify operational sound and vibration significant effects. This will be reported in the formal ES.
- 13.5.21 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

- 13.5.22 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme.
- 13.5.23 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.
- 13.5.24 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 Ulley to Bramley area.

14.1.2 Engagement with Highways England, Rotherham Metropolitan Borough Council (RMBC) and Sheffield City Region (SCR) has been undertaken. An important focus of this engagement has been to obtain relevant baseline information and discuss transport survey requirements and assessment methodology. This engagement process will continue as part of the development of the Proposed Scheme.

14.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2: LA12 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)¹²⁰.

14.2.2 The study area for traffic and transport includes; Brampton-en-le-Morthen, Thurcroft, Morthen, Wickersley, Hellaby, and Bramley.

14.2.3 The study area also includes all roads potentially affected by the Proposed Scheme including: the M1 and the M18, which are the only strategic routes in the Ulley to Bramley area. It also includes the following local roads: the A631 Bawtry Road; the B6060 Morthen Road/Woodhouse Green/Green Arbour Road; the B6410 Morthen Lane; Long Road; Penny Hill Lane; Brampton Lane; Katherine Road; Brampton Road; Woodhouse Green; Kingsforth Lane; Cumwell Lane; Sandy Lane; Flash Lane; Denaby Way; Hellaby Lane; Lidget Lane; Bramley Lane; and Common Lane.

14.2.4 The potential effects on traffic and transport have been assessed qualitatively, based on the Proposed Scheme design, proposed construction routes, initial estimates of construction traffic and professional judgement.

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

14.3 Environmental baseline

Existing baseline

14.3.1 Existing conditions in the study area have been determined through site visits, traffic and transport surveys, liaison with Highways England, RMBC and SCR (including

¹²⁰ Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

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 in June, July and November 2017. These data have been supplemented by existing traffic data from other sources, including from Highways England and RMBC. 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 (3%) between the observed peak hours and the periods 08:00-09:00 and 17:00-18:00, which are the periods when HS2 construction traffic movements and workforce arrivals and departures would have the maximum impact. Consequently, the 08:00-09:00 and 17:00-18:00 periods have been used as the assessment hours representing a reasonable worst case.
- 14.3.3 PRoW surveys were undertaken in August and September 2017 to establish their nature and usage by non-motorised users (pedestrians, cyclists and equestrians). The surveys included PRoW and roads that would cross the route of the Proposed Scheme, and any additional PRoW and roads that may be affected by the Proposed Scheme. The majority of the PRoW surveys were undertaken during the weekend, at times when recreational use is expected to be highest, but where routes are likely to be used for non-leisure uses such as commuting, surveys were undertaken on a weekday.

Strategic and local highway network

- 14.3.4 The strategic routes that pass through the area are: the M1 and the M18. The strategic road network is busy at peak times with delays experienced on the M1 and M18, particularly where the motorways meet at the M1 junction 32 and on the approaches to the M18 junction 1.
- 14.3.5 The local roads that could be affected by the Proposed Scheme include: the A631 Bawtry Road; the B6060 Morthen Road/Woodhouse Green/Green Arbour Road; the B6410 Morthen Lane; Long Road; Penny Hill Lane; Brampton Lane; Katherine Road; Brampton Road; Woodhouse Green; Kingsforth Lane; Cumwell Lane; Sandy Lane; Flash Lane; Denaby Way; Hellaby Lane; Lidget Lane; Bramley Lane; and Common Lane. The A631 Bawtry Road approaches to the M18 junction 1 are busy at peak times, but the remainder of the local road network generally operates well although some localised delays can be experienced.
- 14.3.6 Relevant accident data for the road network subject to assessment have been obtained from the Department of Transport¹²²¹. Data for the three year period (December 2014 to December 2017) have been assessed and any identified clusters (i.e. where there are nine or more accidents in the three year period) have been examined.

¹²²¹ Department for Transport; www.crashmap.co.uk. CrashMap provides accident data for the UK.

- 14.3.7 One accident cluster was identified within the Ulley to Bramley area at the A631 Bawtry Road/B6060 Morthen Road roundabout (nine accidents, including one with serious casualties).
- 14.3.8 The route of the Proposed Scheme would cross three roads with footways within the Ulley to Bramley area. These are: the A631 Bawtry Road; the B6060 Morthen Road; and Sandy Lane. In addition, Penny Hill Lane, Brampton Lane, Lidget Lane and Common Lane have no footways but were observed to be used by pedestrians.

Parking and loading

- 14.3.9 There is on-street and private parking within the Ulley to Bramley area that could be impacted by the Proposed Scheme.

Public transport network

- 14.3.10 Eleven bus routes operate on five roads that would be crossed by the route of the Proposed Scheme in the Ulley to Bramley 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:

- Penny Hill Lane: Service 20 (Rotherham - Ulley - Thurcroft - Dinnington - Woodsetts);
- the B6060 Morthen Road: Service 19, 19a, 19b (Rotherham - Wickersley - Thurcroft - Dinnington - North Anston - Woodsetts – Worksop); and Service X5 (Sheffield - Swallownest - Aston - Wales - Kiveton Park - South Anston - Dinnington - Laughton Common - Thurcroft);
- Sandy Lane: Service 18 (Doncaster - Edlington - Braithwell - Maltby - Bramley - Thurcroft - Dinnington);
- the A631 Bawtry Road: Service 18 (Doncaster - Edlington - Braithwell - Maltby - Bramley - Thurcroft - Dinnington); Service 10 (Rotherham - Whiston - Brecks - Wickersley - Hellaby - Maltby - Braithwell - Edlington - Balby - Doncaster); Service 87 (Sheffield - Meadowhall - Brinsworth - Wickersley - Bramley - Maltby); Service X7 (Sheffield - Whiston - Wickersley - Bramley - Maltby); and Service X1 (Sheffield - Attercliffe - Carbrook - Meadowhall - Tinsley - Templeborough - Rotherham - Herringthorpe - Wickersley - Maltby); and
- Common Lane: Service 1 (Rotherham - Wickersley - Bramley - Hellaby - Ravenfield Common); and Service 37 (Rotherham - East Dene - Eastwood - Dalton - Thrybergh - Ravenfield Common - Hellaby).

- 14.3.11 Regional and local rail services are accessible via Rotherham Central Station. Rotherham Central Station provides access to conventional rail services to Sheffield and Hull.

Non-motorised users

- 14.3.12 There are pedestrian footways adjacent to many of the roads in the built up areas of Thurcroft, Wickersley, Bramley and Hellaby. 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 existing route of six PRoW within the Ulley to Bramley area that could be affected either temporarily or permanently due to, for example, temporary diversion of PRoW during construction and permanent diversions or upgrades including for maintenance access to the Proposed Scheme. The surveys undertaken to inform the assessment showed that fewer than 10 people a day were recorded using two of the PRoW during the survey day. The routes with the greatest usage during the survey day were the B6060 Morthen Road used by 64 pedestrians, 134 cyclists and 3 equestrians; and the B6025 Alfreton Road used by comprising 137 pedestrians and 29 cyclists.
- 14.3.14 In the Ulley to Bramley area, National Route 6 (part of the National Cycle Network) passes through the area to the west of the route of the Proposed Scheme and links to Rotherham and Worksop. National Route 674 passes to the east connecting Thurgroft or Woodsetts. Both routes include on-road and off-road provision.

Waterways and canals

- 14.3.15 There are no navigable waterways in the Ulley to Bramley area. Consequently, this topic is not considered further in this assessment.

Air transport

- 14.3.16 There is no relevant air transport in the Ulley to Bramley area. Consequently, this topic is not considered further in this assessment.

14.4 Effects arising during construction

Avoidance and mitigation measures

- 14.4.1 The following measures are currently proposed to avoid or reduce effects on transport users:
- new highways (roads and PRoW) would be constructed and operational prior to the permanent closure of any existing highways, insofar as reasonably practicable;
 - the majority of roads crossing the route of the Proposed Scheme would be maintained or locally diverted during construction to limit the need for diversions of traffic onto alternative routes;
 - traffic management measures would be implemented to limit any disruption;
 - road closures would be restricted to overnight and weekends, insofar as reasonably practicable;
 - temporary alternative routes for PRoW would be provided during construction, insofar as reasonably practicable, where either the existing or final proposed route is not available;
 - where reasonably practicable, site haul routes would be created adjacent to the route of the Proposed Scheme to transport construction materials and

equipment to reduce heavy goods vehicle (HGV) movements on public roads with access taken via the main road network;

- HGV would be routed, insofar as reasonably practicable, along the strategic and/or primary road network;
- the use of the local road network would, insofar as reasonably practicable, be limited to use for site set-up, access for surveys and on-going servicing (including refuse collection and general deliveries to compounds) during construction;
- the reuse of excavated material along the route of the Proposed Scheme, insofar as reasonably practicable;
- highway measures including junction improvements, passing places and carriageway widening would be provided, as required, to manage the safe passing of construction vehicles on construction HGV routes; and
- on-site welfare facilities would be provided which would reduce daily travel by site workers.

14.4.2 Section 14 of the draft Code of Construction Practice (CoCP)^{122,123} includes measures that aim to reduce the adverse impacts and effects on local communities and maintain public access. This includes the impacts of deliveries of construction materials and equipment.

14.4.3 The measures in the draft CoCP include controls on vehicle types, hours of site operation and routes for HGVs to reduce the impact of road-based construction traffic. In order to achieve this, general and site specific traffic management measures would be implemented during the construction of the Proposed Scheme on or adjacent to public roads and PRow affected by the Proposed Scheme.

14.4.4 The draft CoCP includes the requirement to develop local traffic management plans in consultation with the highway and traffic authorities and the emergency services. These would consider the local traffic management strategy including consideration of sensitive receptors, such that adverse impacts would be reduced insofar as reasonably practicable and any effect on safety and accidents would not be significant

14.4.5 Specific measures would include core site operating hours of 08:00-18:00 on weekdays and 08:00-13:00 on Saturdays with site staff and workers generally arriving before the morning peak hour and departing after the evening peak hour.

14.4.6 The number of private car trips to and from the construction compounds (both workforce and visitors) would be reduced by encouraging alternative sustainable modes of transport or vehicle sharing. This would be supported by an overarching

¹²² A draft CoCP has been prepared. It will remain a draft document through the parliamentary process and will be finalised at Royal Assent. The CoCP sets out measures to be implemented by the nominated undertaker

¹²³ Supporting document: Draft Code of Construction Practice

framework travel plan that would require construction workforce travel plans¹²⁴ 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 Ulley to Bramley 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 Ulley to Bramley 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: LA12 Map Book.

Strategic and local road network traffic

- 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 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 M18 junction 1;
 - the A631 Bawtry Road between the B6060 Morthen Road and Denby Way;
 - the B6060 Morthen Road between the A631 Bawtry Road and the M1;
 - the B6060 Woodhouse Green between the B6060 Morthen Road and the B6060 Green Arbour Road;

¹²⁴ 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.

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- the B6060 Green Arbour Road between the B6060 Woodhouse Green and Katherine Road;
- Long Road;
- Penny Hill Lane from east of Brampton Lane to Common Lane;
- Brampton Lane from west of the M1 to Wood Lane;
- Katherine Road;
- Brampton Road between the B6060 Morthen Road and Katherine Road;
- Kingsforth Lane from north of the B6060 Morthen Road to Cumwell Lane;
- Sandy Lane;
- Broadlands;
- Westerton Drive;
- Wood Fields;
- Finch Gardens;
- Flash Lane;
- Denby Way;
- Hellaby Lane;
- Lidget Lane for approximately half of its length to the south-west of Bramley Lane;
- Bramley Lane; and
- Common Lane.

14.4.12 A number of these construction routes would have limited use¹²⁵ including the B6060 Woodhouse Green/Green Arbour Road, Katherine Road, Brampton Road, Sandy Lane (from east of Broadlands to Kingsforth Lane), Broadlands, Westerton Drive, Wood Fields, and Finch Gardens.

14.4.13 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:

- overnight and weekend closures of the M1 between Brampton Lane and the M1 northbound off-slip/M18 northbound on-slip;
- overnight and weekend closures of the M18 southbound off-slip/M1

¹²⁵ Limited use refers to a low level of HGV use generally over a short length of time, for example for site set up or minor works

northbound on-slip;

- overnight and weekend closures of the M1 northbound off-slip/M18 northbound on-slip;
- local re-alignment of the A631 Bawtry Road at junction 1 of the M18;
- closure of Brampton Lane from west of the M1 to Wood Lane, with local diversion routes available;
- closure of Sandy Lane from east of Broadlands to Kingsforth Lane, with local diversion routes available;
- closure of Lidget Lane south-west of Bramley Lane, with local diversion routes available; and
- closure of Common Lane east of Braithwell Road, with local routes available.

14.4.14 Permanent changes to highways are reported under operation.

14.4.15 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.

14.4.16 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

14.4.17 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.

Parking and loading

14.4.18 It is currently expected that the Proposed Scheme could have temporary impacts on parking. This would include parking bays or other parking amenities which could be affected or temporarily suspended due to construction works. Some roads that could be used as construction routes and have on-street parking could be affected. Any significant effects will be reported in the formal ES.

Public transport network

14.4.19 It is expected that construction of the Proposed Scheme would require the following temporary bus route diversions: Service 1; Service 18; and Service 37. 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

14.4.20 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.

14.4.21 There would be temporary alternative routes for a number of PRoW in the vicinity of the Proposed Scheme. It is currently expected that the following PRoW would be temporarily diverted/realigned or closed:

- Thurcroft Bridleway 7 (north of Wood Lane, near Brampton en le Morthen);
- Wickersley Footpath 8b (west of Kingsnorth Lane, near Thurcroft); and
- Wickersley Footpath 9 (west of Kingsnorth Lane, near Thurcroft).

14.4.22 Permanently diverted PRoW are reported under operation, although these PRoW could also be subject to temporary closure or diversion/realignment.

14.4.23 The changes to PRoW are likely to result in some increases in travel distance with the potential for adverse significant effects. The assessment of these will be reported in the formal ES.

Permanent effects

14.4.24 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

14.4.25 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.

14.4.26 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

14.4.27 Construction of the Proposed Scheme would potentially lead to additional congestion and delays for road users on a number of routes including: the M18 junction 1; the A631 Bawtry Road; the B6060 Morthen Road/Woodhouse Green/Green Arbour Road; Long Road; Penny Hill Lane; Brampton Lane; Katherine Road; Brampton Road; Kingsforth Lane; Cumwell Lane; Sandy Lane; Broadlands; Westerton Drive; Woods Fields; Finch Garden; Flash Lane; Denaby Way; Hellaby Lane; Lidget Lane; Bramley Lane; and Common Lane. Changes in traffic could also result in increased traffic severance for non-motorised users of the routes and changes in traffic could result in changes in accident risk.

14.4.28 Construction of the Proposed Scheme is also likely to result the temporary closures and diversions or realignments of the following: the M18 southbound off-slip/M1 northbound on-slip; the M1 northbound off-slip/M18 northbound on-slip; the A631 Bawtry Road; Brampton Lane; Sandy Lane; Lidget Lane; and Common Lane.

14.4.29 It is currently expected that construction of the Proposed Scheme could have temporary impacts on parking and loading.

- 14.4.30 Construction of the Proposed Scheme would require bus route diversions, including: bus routes 1, 18 and 37.
- 14.4.31 Construction of the Proposed Scheme would require the temporary closure or diversion/realignment of PRoW, including: Thurcroft Bridleway 7; Wickersley Footpath 8b; and Wickersley Footpath 9.
- 14.4.32 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 Ulley to Bramley 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 closure of roads and the diversion or closure of PRoW.

Highway network

Strategic and local road network traffic

- 14.5.5 The Proposed Scheme would result in a number of permanent highway changes. These include:
- the M18 junction 1 would be extended to the west with associated modifications to the M18 northbound entry and exit slip roads, and the A631 Bawtry Road approach;
 - the B6060 Morthen Road and B6060 Woodhouse Green would be realigned, with a new bridge crossing over the M18 and two new roundabouts providing connections onto Brampton Road to the east, and the B6410 Morthen Lane and the existing B6060 Morthen Road that would be permanently closed;
 - Sandy Lane would be realigned via an overbridge;

- Lidget Lane would be realigned via an overbridge; and
- Common Lane would be realigned via an overbridge.

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.

Parking and loading

14.5.8 There is potential for a permanent loss of car parking at locations along the route of the Proposed Scheme in this area. Where car parking is lost that would have served facilities that are displaced by the Proposed Scheme this is not considered a material effect. The assessment of the effects of these changes will be reported in the formal ES.

Public transport network

14.5.9 The Proposed Scheme is not expected to have a significant effect on public transport operations in the Ulley to Bramley area.

Non-motorised users

14.5.10 A number of PRow that cross the route of the Proposed Scheme would be either permanently realigned or diverted including:

- the eastern end of Moat Lane (to the east of the M18, north-east of Thurnscoe) would be permanently closed;
- Carr Lane (to the south of Penny Hill Windfarm) would be realigned with a new underbridge;
- Thurcroft Bridleway 7 (north of Wood Lane, near Brampton en le Morthen) would be diverted to the west with a new connection onto Brampton Lane;
- Wickersley Footpath 8b (west of Kingsnorth Lane, near Thurcroft) would be diverted to the south over a new overbridge;
- Wickersley Footpath 9 (west of Kingsnorth Lane, near Thurcroft) would be diverted to the south over the new accommodation overbridge (shared with Wickersley Footpath 8b); and
- the southern section of Bramley Footpath 7 (between Westerton Drive and the M18, Wickersley) would be diverted to the west.

14.5.11 The realignment of some of the PRow would increase journey distance and time for non-motorised users and may result in significant effects. No diversion is expected to require additional travel distance in excess of 500m. The assessment of changes to PRow will be reported in the formal ES.

Other mitigation measures

- 14.5.12 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.
- 14.5.13 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

- 14.5.14 Operation of the Proposed Scheme would require the permanent diversion of: the M18 junction 1; the B6060 Morthen Road/Woodhouse Green; Woodhouse Green; Sandy Lane; Lidget Lane; and Common Lane. Increases in traffic could also result in increased traffic severance for non-motorised users of the routes and changes in traffic could result in changes in accident risk.
- 14.5.15 There is potential for a permanent loss of car parking and loading at locations along the route of the Proposed Scheme in this area.
- 14.5.16 Operation of the Proposed Scheme would require the permanent closure or diversion/realignment of six PRoW, including: Moat Lane; Carr Lane; Thurcroft Bridleway 7; Wickersley Footpath 8b, Wickersley Footpath 9; and Bramley Footpath 7.
- 14.5.17 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

- 14.5.18 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme.
- 14.5.19 There are no other area-specific monitoring requirements currently proposed for traffic and transport in the Ulley to Bramley 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 Ulley to Bramley area. The likely impacts and significant effects identified to date arising from the construction and operation of the Proposed Scheme on surface water and groundwater bodies and their associated water resources are reported. The likely impacts and significant effects of the Proposed Scheme on flood risk and land drainage are also reported.
- 15.1.2 Engagement has been undertaken with the Environment Agency, Canal & River Trust and Rotherham Metropolitan Borough Council (RMBC) which is the Lead Local Flood Authority (LLFA). Engagement has also been undertaken with Yorkshire Water Services 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: LA12 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 compliance of the Proposed Scheme with the Sequential Test and Exception Test policies in the National Planning Policy Framework (NPPF)¹²⁶.

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 Part B, Section 21 of the Scope and Methodology Report (SMR)¹²⁷.
- 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

¹²⁶ National Planning Policy Framework, DCLG, 2015

¹²⁷ 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 data, 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 Morthen Brook (including Pinch Mill Brook), Kingsforth Brook and Hellaby Brook.
- 15.2.6 Groundwater levels have been inferred from the available Environment Agency groundwater level monitoring boreholes, historic borehole logs and topographic data, as well as from spring and watercourse locations.
- 15.2.7 Impacts on biological receptors such as aquatic fauna and flora are assessed in Section 7, Ecology and biodiversity.
- 15.2.8 The assessments in this working draft ES are based on professional judgement using the information that is currently available. A precautionary approach has been adopted with regards to assessing the potential for adverse impacts to occur. The surveys, analysis and modelling work currently in progress, and the results of the consultation process, will be used to refine the assessments reported in the formal ES.

15.3 Environmental baseline

Existing baseline - Water resources and WFD

Surface water

- 15.3.1 All surface water bodies in the study area fall within the Don and Rother and the Idle and Torne management catchments of the Humber river basin district (RBD).
- 15.3.2 The river basin management plan¹²⁸ identifies the chemical¹²⁹ and ecological¹³⁰ status of surface water bodies, and the quantitative¹³¹ and chemical¹³² status of groundwater bodies within this RBD.
- 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

¹²⁸ Environment Agency (2015), Water for life and livelihoods Part 1: Humber river basin district: River basin management plan

¹²⁹ The chemical status of surface waters reflects concentrations of priority and hazardous substances present

¹³⁰ 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.

¹³¹ 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

¹³² 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

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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 this study area is provided in Table 27. The receptor values attributed to each individual water body is based on the methodologies set out in the SMR.

Table 27: Surface water body receptors

Water body name and location ¹³³)	Designation	Watercourse Q95 value (m ³ /s) ¹³⁴	Receptor value	Parent WFD water body name and identification number ¹³⁵	Current WFD status/ Objective ¹³⁶
Tributary of Ulley Brook 4 WR-01-363b B6	Ordinary watercourse	<0.002	Low	Ulley Brook from Source to River Rother	Good/ Good by 2027
Tributary of Ulley Brook 5 WR-01-363b C6	Ordinary watercourse	<0.002	Low	GB 104027057740	
Tributary of Morthen Brook 1 WR-01-363b J5	Ordinary watercourse	<0.002	Low		
Tributary of Morthen Brook 2 WR-01-363b J5	Ordinary watercourse	<0.002	Low		
Tributary of Morthen Brook 3 WR-01-363b J5-J6	Ordinary watercourse	<0.002	Low		
Tributary of Morthen Brook 4 WR-01-363b J5	Ordinary watercourse	<0.002	Low		
Morthen Brook WR-01-364 G5	Ordinary watercourse	0.002	Low		

¹³³ The feature locations are indicated by the grid coordinates on the relevant Volume 2: LA12 Map Book figure (in this case WR-01)

¹³⁴ This is the flow within the watercourse that is exceeded for 95% of the time

¹³⁵ The Environment Agency has attributed each surface water and groundwater body a unique water body identification (ID) number

¹³⁶ Status and objectives are based on those set out in the 2015 River basin management plan

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Water body name and location ¹³³)	Designation	Watercourse Q95 value (m ³ /s) ¹³⁴	Receptor value	Parent WFD water body name and identification number ¹³⁵	Current WFD status/ Objective ¹³⁶
Pinch Mill Brook WR-01-364 F5-F6	Ordinary watercourse	<0.002	Moderate	Rother, Doe Lea to Don GB104027057772	Moderate/ Good by 2027
Kingsforth Brook WR-01-364 E5	Ordinary watercourse	0.002	Low	Oldcotes Dyke Catchment (tributary of Ryton) GB104028058230	Poor/ Moderate by 2015
King's Pond WR-01-364 E5	Static water body	n/a	Moderate		
Tributary of Hellaby Brook 1 WR-01-364 C5	Ordinary watercourse	0.004	Low		
Tributary of Hellaby Brook 2 WR-01-364 C5	Ordinary watercourse	0.003	Low		
Hellaby Brook WR-01-364 B6	Ordinary watercourse	<0.002	Low		
Tributary of Hellaby Brook 3 WR-01-364 C5	Ordinary watercourse	<0.002	Low		

Abstractions and permitted discharges (surface water)

- 15.3.6 There is one licensed surface water abstraction in the study area, located within the land required for the Proposed Scheme adjacent to the proposed crossing of tributary of the Hellaby Brook 1 at Bramley Lings culvert. This has been assessed as being a moderate value receptor.
- 15.3.7 Records of private unlicensed surface water abstractions, which comprise those for quantities less than 20m³ per day, have been requested from the local authorities. Responses are being sought. As there is no obligation to register private water supplies, unregistered private surface water supplies may be present. Private water supplies would be assessed as high value receptors unless details obtained from the owner indicate otherwise.
- 15.3.8 There are six¹³⁷ consented discharges to surface waters within the study area, one of which is within the land required for the Proposed Scheme. This has been assessed as being a low value receptor.

¹³⁷ The number of consents listed here is different to the number listed in Section 10, Land quality. This is because the Water resources and flood risk default study area comprises all land within 1km of the centreline of the Proposed Scheme; the Land quality default study area extends 250m.

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 28. Unless stated otherwise, the geological groups listed would all be crossed by the Proposed Scheme. Table 28 also identifies the receptor values attributed to each groundwater receptor based on the methodologies set out in the SMR.

Table 28: Summary of geology and hydrogeology in the study area

Geology ¹³⁸	Distribution	Formation description	Aquifer classification	WFD body (ID) and current overall status ¹³⁹	WFD status objective ¹⁴⁰	Receptor value
Superficial deposits						
Alluvium	Along a tributary of Hellaby Brook	Clays, organic clays, peat, silts, sands and gravels	Not classified	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Low
Bedrock						
Pennine Upper Coal Measures Formation	north of Brampton-en-le-Morthern	Interbedded Mudstone/siltstone/sandstone with coal seams.	Secondary A	Don and Rother Millstone Grit and Coal Measures (GB40402G992300) Poor	Good by 2027	Moderate
Pennine Middle Coal Measures	At the southern end of the study area to the south of Brampton-en-le-Morthen	Interbedded grey mudstone, siltstone, pale grey sandstone and commonly with coal seams.	Secondary A	Don and Rother Millstone Grit and Coal Measures (GB40402G992300) Poor	Good by 2027	Moderate

Superficial deposit aquifers

- 15.3.10 The basis of the receptor values attributed to the superficial deposit aquifers present within the study area, as shown in Table 28, is outlined briefly as alluvium, but in such a small isolated area that the Environment Agency has not classified it with regards to aquifer importance. It has therefore been assessed as a low 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 28 is outlined briefly as the Pennine Upper Coal

from the land required for the construction of the Proposed Scheme. These default study areas are extended where the potential for wider pathways exists.

¹³⁸ 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.

¹³⁹ These objectives are as stated in the 2015 Environment Agency River basin management plan

¹⁴⁰ These objectives are as stated in the 2015 Environment Agency River basin management plan

Measures Formation and the Pennine Middle Coal Measures Formation which have both been classified as Secondary A aquifers by the Environment Agency. These aquifers may be capable of supporting water supplies at a local rather than regional scale, and may also form an important source of baseflow to rivers. They have therefore been assessed as moderate value receptors.

WFD status of groundwater bodies

- 15.3.12 A summary of locations, current overall WFD status, and future overall status objectives associated with the designated bedrock groundwater bodies within the study area is provided in Table 28. 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 licenced for public water within the study area. There is one source protection zone (SPZ) at the Hellaby Industrial Estate, on the east side of the M1. The SPZ extends under the proposed route of the Proposed Scheme. This SPZ is not associated with any current licensed groundwater abstraction.
- 15.3.15 There are no private groundwater abstraction licences registered in the study area.
- 15.3.16 Records of private unlicensed groundwater abstractions, which comprise those for quantities less than 20m³ per day, have been requested from the local authorities. Responses are being sought. As there is no obligation to register private water supplies, unregistered private surface water supplies may be present. Private water supplies would be assessed as high value receptors unless details obtained from the owner indicate otherwise.
- 15.3.17 There is one¹⁴¹ consented discharge to groundwater within the study area. 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 22 features within the study area that had potential to be springs. Access was possible to inspect six of these features, of which:
- two were found to be non-existent and have been removed from the assessment;
 - two surveys were found to be inconclusive and these locations have therefore, been assessed as potential springs with a low receptor value; and
 - two were springs, both located west of Birk Lodge Farm at the northern end of

¹⁴¹ The number of consents listed here is different to the number listed in Section 10, Land quality. This is because the Water resources and flood risk default study area comprises all land within 1km of the centreline of the Proposed Scheme; the Land quality default study area extends 250m from the land required for the construction of the Proposed Scheme. These default study areas are extended where the potential for wider pathways exists.

the study area, assessed as having a low receptor value.

15.3.19 The 16 potential spring features that have yet to be inspected are assumed to be high value receptors on a precautionary basis. Two of these potential spring features are within the land required for the Proposed Scheme, one to the west of Penny Hill, and one east of Bramley.

15.3.20 There are five 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 designated nature conservation sites within the study area which are dependent on groundwater flows have the potential to be affected by the Proposed Scheme.

15.3.22 No designated nature conservation sites within the study area which are dependent on surface water flows have the potential to be affected by the Proposed Scheme.

Existing baseline - flood risk and land drainage

15.3.23 The Environment Agency's Flood map for planning (rivers and sea)¹⁴² 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 Risk of Flooding from Surface Water¹⁴³ 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 dataset¹⁴⁴. The British Geological Survey's (BGS) Groundwater flooding susceptibility data set¹⁴⁵, 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:

- RMBC Strategic Flood Risk Assessment (SFRA) Level 1 (2008)¹⁴⁶;
- RMBC Flood Risk Toolkit and Level 2 SFRA (2011)¹⁴⁷;
- RMBC Preliminary Flood Risk Assessment (PFRA) (2011)¹⁴⁸; and
- Rotherham Local Flood Risk Management Strategy (LFRMS) (2014)¹⁴⁹.

¹⁴² Environment Agency, (2018), Flood Map for Planning. Available online at: <https://flood-map-for-planning.service.gov.uk/>

¹⁴³ Environment Agency, (2018), Learn more about this area's flood risk. Available online at: <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?eastings=436042&northings=428966&address=72383505>

¹⁴⁴ Environment Agency, (2018), Learn more about this area's flood risk. Available online at: <https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?eastings=436042&northings=428966&address=72383505>

¹⁴⁵ British Geological Survey (BGS) (2018) BGS groundwater flooding. Available online at: <http://www.bgs.ac.uk/products/hydrogeology/groundwaterFlooding.html>

¹⁴⁶ Rotherham Metropolitan Borough Council Strategic Flood Risk Assessment (PFRA) (2008) ¹⁴⁶ Jacobs

¹⁴⁷ Rotherham Metropolitan Borough Council Flood Risk Toolkit (2011) Jacobs

¹⁴⁸ Rotherham Metropolitan Borough Council south Preliminary Flood Risk Assessment (SFRA) (2014) Rotherham Metropolitan Borough Council

¹⁴⁹ Rotherham Local Flood Risk Management Strategy (LFRMS) (2014) Rotherham Metropolitan Borough Council

River flooding

- 15.3.26 The study area includes areas of floodplain (Flood Zone 2 and 3) associated with a tributary of Hellaby Brook. Table 29 shows the watercourses within the study area and the 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 29: River flood risk sources and receptors

Source	Location description and figure/coordinate ¹⁵⁰	Receptor potentially affected	Receptor value/sensitivity to flooding
Tributary of the Hellaby Brook 1	Downstream of Bramley Lings culvert WR-01-364 C6	Denaby Way	Moderate
		Hellaby Lane	Moderate
		Fretwell Road	Moderate
		Commercial property on Hellaby Lane	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 30. The value of these receptors, based on Table 57 of the SMR, is also indicated.

Table 30: Surface water flood risk sources and receptors

Source	Location description and figure/coordinate ¹⁵¹	Receptor potentially affected	Receptor value
Surface water flow path at Penny Hill South culvert	south of Penny Hill WR-01-363b C6	M1	Very high
		Agricultural land	Moderate
		Telecommunications mast	Moderate
Surface water flow paths at Penny Hill North culvert	Penny Hill WR-01-363b b6	Penny Hill Farm	High
		Brampton Villa	High
		Commercial properties on Penny Hill Lane	Moderate
		M1	Very high
		Agricultural land	Moderate
		Residential property on Penny Hill Lane	High
		Penny Hill Lane	Moderate
	Brampton-en-le-Morthen	Wood Lane	Moderate

¹⁵⁰ This is the location at which the source intersects the Proposed Scheme, as indicated by the grid coordinates on the relevant Volume 2: LA12 Map Book figure (in this case WR-01)

¹⁵¹ This is the location at which the source intersects the Proposed Scheme, as indicated by the grid coordinates on the relevant Volume 2: LA12 Map Book figure (in this case WR-01)

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Source	Location description and figure/coordinate ¹⁵¹	Receptor potentially affected	Receptor value
Surface water flow path at Thurcroft South viaduct	WR-01-364 H6	M18	Very high
		Brampton Lane	Moderate
		Lea House, Brampton Road	High
		Common Lane	Moderate
Surface water flow path at Thurcroft North viaduct associated with the Morthen Brook	Thurcroft WR-01-364 G5	Blackhill Farm	High
		M18	Very high
		M1	Very high
Surface water flow path flowing to Morthen Brook at Morthen Lane realignment	Nether Moor Field WR-01-364 F5-F6	B6410 Morthen Lane	Moderate
Surface water flow path at Morthen Lane realignment at Pinch Mill Brook	north of Morthen Lodge WR-01-364 F5-F6	B6060 Morthen Road	Moderate
		B6410 Morthen Lane	Moderate
		Properties along B6410 Morthen Road (3 properties potentially affected)	High
Surface water flow path at King's Pond Plantation culvert	King's Pond Plantation WR-01-364 E5	Outbuilding at Woodside Bungalow	Moderate
		Second Lane	Moderate
		Allotment buildings on Second Lane	Moderate
		Sewage pumping station	Very high
		King's Pond Plantation	Low
		Slack Farm	High
		M18	Very high
		Kingsforth Lane	Moderate
Surface water flow paths in and around Bramley Lings between Sandy Lane and of the M18 junction 1 located south of Bramley Lings culvert	Bramley Lings WR-01-364 D5	Residential roads within Bramley Lings	High
		M18	Very high
		Bramley Lings industrial and commercial estate	Moderate
Surface water flow path at Bramley Lings culvert	Bramley and Hellaby Industrial Estate WR-01-364 C5	Residential area within Bramley accessed via Ranworth Road and Lidgett Lane (in excess of 50 houses potentially affected)	High
		M18	Very high

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Source	Location description and figure/coordinate ¹⁵¹	Receptor potentially affected	Receptor value
		Industrial property and roads within Hellaby Industrial Estate accessed via Lowton Way	Moderate
Surface water flow path at Lidgett Lane located south of Hellaby Brook inverted siphon	north of Hellaby Park Farm WR-01-364 B6	Lidgett Lane	Moderate
Surface water flow path at Hellaby Brook inverted siphon	Braithwell Common WR-01-364 B6	Properties within residential area of Bramley south of Braithwell Lane (approximately 20 properties potentially affected)	High
		Moor Lane South	Moderate
		Lidgett Lane	Moderate
		M18	Very high
		Hellaby Lane	Moderate
		Telecommunications mast accessed off of Hellaby Lane	Moderate

Artificial water bodies

- 15.3.28 Flooding from artificial water bodies may occur due to failure of an impounding structure, such as a dam or canal embankment. The Environment Agency's risk of flooding from reservoirs national dataset¹⁴⁴ indicates that there are no reservoirs with potential implications for flood risk within the study area.
- 15.3.29 An artificial water body, in King's Pond Plantation, has been identified along the Kingsforth Brook, 20m upstream of the Proposed Scheme. The flood risk posed by this feature has been recognised and so a breach analysis will be undertaken to determine the area potentially inundated by floodwater. The potential risk of inundation will be reported in the formal ES.

Groundwater flooding

- 15.3.30 Information related to historical incidents of groundwater flooding in the Ulley to Bramley area is provided within the RMBC SFRA and LFRMS. These documents state that there is no history of groundwater flooding within the Rotherham Borough area.
- 15.3.31 The British Geological Survey's Groundwater flooding susceptibility data set indicates that there is some potential for groundwater flooding to occur across the study area where it is underlain by sandstone. Generally, there is limited potential for groundwater flooding to occur, except at the northern end of the study area where sandstone is present under the Hellaby Industrial Estate and there is an increased potential for groundwater flooding to occur.

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)¹⁵² includes a range of mitigation measures that aim to reduce construction impacts insofar as reasonably practicable. The avoidance and mitigation measures that are of particular relevance to water resources and flood risk during construction are described in the following sections of this report.

Water resources and WFD

- 15.4.2 The avoidance of sensitive receptors has reduced the risks associated with the Proposed Scheme not complying with the requirements of the WFD. Examples of this strategy include:
- avoidance of channels and floodplain areas, where reasonably practicable – the route of the Proposed Scheme will avoid passing along river or stream valleys, such as that of the tributaries of Ulley Brook, Morthen Brook and Hellaby Brook and their associated floodplains. Instead it would pass over these larger watercourses on viaducts spanning the floodplain, with piers set back from the channel;
 - 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.

¹⁵² Supporting document: Draft Code of Construction Practice

- 15.4.4 The temporary works shown on Map Series CT-05 in Volume 2: LA12 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 on Hellaby Brook. The aim will be to design this with equivalent hydraulic capacity to the existing channel. The design of the Proposed Scheme will also aim to ensure that field subsurface drainage systems could be adapted to discharge into the new channel. Where such watercourses are natural channels, the design principle would be to incorporate appropriate features to retain and, where reasonably practicable, enhance their hydromorphological condition¹⁵³.
- 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 watercourse diversions proposed within this study area.
- 15.4.7 For watercourses that are not in their natural condition, the design aim for diversions would 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, insofar as 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 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 and biodiversity.

¹⁵³ '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

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- 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 which would cross the Proposed Scheme within this study area include:
- Penny Hill South culvert;
 - Penny Hill North culvert;
 - King's Pond Plantation culvert;
 - Bramley Lings culvert; and
 - an inverted siphon on Hellaby Brook.
- 15.4.12 The detailed design of these structures will be developed in general accordance with Construction Industry Research and Information Association (CIRIA) and Environment Agency guidance and in consultation with Environment Agency specialists. The design has sought to mitigate the impact on the hydromorphology of the affected watercourses, as follows:
- drop inlet culverts and inverted siphons have been avoided wherever reasonably practicable. In the Ulley to Bramley area, there will be one inverted siphon on Hellaby Brook, which is designated as an ordinary watercourse of low value;
 - culvert lengths have been reduced insofar as 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.
- 15.4.13 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.
- 15.4.14 Existing groundwater abstraction boreholes or monitoring points would be protected from physical damage, insofar as reasonably practicable, including appropriate decommissioning of abandoned boreholes in order to prevent pollution pathways. If boreholes are to be decommissioned and replaced with alternatives, the contractors will follow the latest good practices. This principle would 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 would aim to recreate affected spring features nearby.
- 15.4.15 Measures will be introduced, as required, to mitigate the temporary and permanent effects on groundwater flows and water quality during excavation and construction of foundations and cuttings insofar as reasonably practicable. The types of measure likely to be adopted could include:

- installation of cut-off¹⁵⁴ 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.

15.4.16 The exact requirements would be refined and method of mitigation will be designed following ground investigation at foundations or cutting locations.

Flood risk and land drainage

15.4.17 The design of the Proposed Scheme will aim to mitigate permanent impacts on flood risk and land drainage as follows:

- the route of the Proposed Scheme avoids all of the mapped fluvial floodplains in the Ulley to Bramley area. The Proposed Scheme includes replacement floodplain storage areas to replace losses associated with the encroachment of viaduct piers, the embankment at the Penny Hill South and Penny Hill North culverts and highway realignments within areas susceptible to flooding;
- the temporary works shown on Map Series CT-05 in the Volume 2:LA12 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 will be achieved using perimeter drainage and culverts, with their inverts set below the likely level of any upstream field subsurface drainage systems;
- in locations where the route of the Proposed Scheme would cross watercourses, the design aim is for structures to accommodate flood flows up to and including the 1 in 100 year (1%) annual probability flood with an allowance for climate change based on latest guidance issued by the Environment Agency¹⁵⁵;
- runoff from the footprint of the infrastructure could occur more rapidly post-construction due to steeper slope angles and the permeability of the newly-created surfaces. The design of drainage systems aims to ensure that there will be no considerable increases in flood risk downstream, during storms up to

¹⁵⁴ Impermeable barrier preventing water flow

¹⁵⁵ Environment Agency (2016) Adapting to Climate Change. Advice for Flood and Coastal Erosion Risk Management Authorities

and including the 1 in 100 year (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 and diverting this water 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 increase flood risk or impact on land drainage systems; and
- measures would be introduced to reduce any potentially significant effects on groundwater flood risk insofar as 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.

15.4.18 The nominated undertaker will, insofar as reasonably practicable, ensure that flood risk is managed throughout the construction period and will consider flooding issues when planning sites and storing materials. If necessary, temporary provision will be made to reduce to the potential for impacts on existing land drainage systems during construction. Some of the specific measures referred to in the draft CoCP, include:

- preparation of flood risk assessments and method statements for temporary works, including main construction and satellite compound drainage, watercourse crossings and realignments and temporary realignments in consultation with the Environment Agency, and where applicable, the LLFA and other relevant regulators;
- location of storage, machinery, equipment and temporary buildings outside flood risk areas where reasonably practicable;
- construction of outfalls during periods of low flow to reduce the risk of scour and erosion;
- design of temporary watercourse realignments with equivalent hydraulic 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.

15.4.19 In accordance with Section 16 of the draft CoCP, monitoring will also be undertaken in consultation with the Environment Agency and, where applicable, the LLFA, to ensure that temporary structures are installed, maintained and removed in accordance with

the relevant environmental approvals and that impact on existing land drainage systems are managed appropriately.

Assessment of impacts and effects

- 15.4.20 This section describes the significant effects following the implementation of the avoidance and mitigation measures. The majority of the potential temporary impacts on the water environment during construction will be avoided or mitigated by the working methods outlined in the draft CoCP. The mitigation embedded into the design has focused on reducing permanent impacts resulting from the presence of the Proposed Scheme to as low a level as is reasonably practicable.

Temporary effects – Water resources and WFD

Surface water

- 15.4.21 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

- 15.4.22 The proposed cuttings in the study area would intersect the Pennine Upper Coal Measures Secondary A aquifer. Whilst there would be 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 this aquifer would not be significant.
- 15.4.23 Where the cuttings could affect local receptors, such as groundwater abstractions or springs, this is reported in the sections below.

Abstractions

- 15.4.24 No groundwater abstractions have been identified within the study area.

Groundwater – surface water interactions

- 15.4.25 No potential for temporary significant effects has been identified in connection with groundwater – surface water interactions.

Water dependent habitats

- 15.4.26 No potential for temporary significant effects has been identified in connection with water dependent habitats.

Temporary Effects - Flood risk and land drainage

- 15.4.27 Construction of the Thurcroft South and Thurcroft North viaducts and the culverts required for the tributaries of Ulley Brook, Morthen Brook, Kingsforth Brook and Hellaby Brook and its tributary would require temporary working within adjacent floodplain areas. 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

- 15.4.28 Permanent effects are those initially caused by activity to construct the Proposed Scheme but which would also remain after the Proposed Scheme has been constructed and is present in the area.

Surface water

- 15.4.29 The assessment has not identified any localised impacts that would give rise to permanent significant effects on surface water quality and channel hydromorphology in the Ulley to Bramley area.

Groundwater

Aquifers

- 15.4.30 It is currently anticipated that implementation of the avoidance and mitigation measures would ensure that there are no permanent significant effects related to the impact of the proposed cuttings on water levels and quality in the aquifers intercepted by the Proposed Scheme.
- 15.4.31 Where the impacts of the proposed cuttings on the aquifers could affect additional local receptors that rely on the groundwater resource, for example springs and abstractions, the impacts on these have been assessed below.

Abstractions

- 15.4.32 No groundwater abstractions have been identified within the study area.

Groundwater – surface water interactions

- 15.4.33 The Proposed Scheme could result in the potential permanent reduction of groundwater catchment, and therefore groundwater flow to the potential springs south of Spenwood Farm and east of Bramley.
- 15.4.34 Until the nature of these features have been confirmed by a site survey, they have been assumed to be high value receptors. The assessment therefore identifies the reduction in catchments as potentially resulting in permanent major adverse effects, which would be significant.

Water dependent habitats

- 15.4.35 No potential for permanent significant effects has been identified in connection with water dependent habitats.

Permanent effects - Flood risk and land drainage

- 15.4.36 The assessment has not identified any localised impacts that would give rise to permanent significant effects related to flood risk in the Ulley to Bramley area.

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.

Groundwater

- 15.4.38 A survey of the two potential spring features, likely to have a reduction of groundwater catchment area due to temporary dewatering, permanent presence of the cuttings, or site drainage, will be undertaken to determine their value and to identify whether further mitigation is required. If they are confirmed to be springs measures would be implemented to reduce the effect on these features insofar as reasonably practicable.

Summary of likely residual significant effects

- 15.4.39 In the absence of the other mitigation measures set out above, the Proposed Scheme would potentially result in residual significant effects to the potential springs south of Spenwood Farm and east of Bramley due to the reduction in catchment. These would be permanent moderate adverse effects.
- 15.4.40 It is currently anticipated that it should be possible to develop the means of mitigating these impacts, to ensure that there are no residual significant effects arising from construction of the Proposed Scheme.

15.5 Effects arising from operation

Avoidance and mitigation measures

- 15.5.1 The principal issue of concern during operation of the Proposed Scheme is the potential for accidental spillages to occur that could result in the release of contaminants into the water environment. This issue has been assessed on a route-wide basis in Volume 3: Route-wide effects, 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 will be no residual significant effects on surface water, groundwater or flood risk during operation of the Proposed Scheme.

Monitoring

- 15.5.8 Volume 1, Section 9, sets out the general approach to monitoring of water resources and flood risk during operation of the Proposed Scheme.
- 15.5.9 There are no area-specific requirements for monitoring water resources and flood risk during operation of the Proposed Scheme.

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