HS2

October 2018

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

Working Draft Environmental Statement

Volume 2: Community Area report

LA03: Appleby Parva to Ashby-de-la-Zouch

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Department for Transport

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

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Preface

The working draft Environmental Statement

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

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

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

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

Consultation on the working draft Environmental Statement

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

Structure of the HS2 Phase 2b working draft Environmental Statement

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

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

The working draft ES comprises the following documents:

Non-technical summary

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

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

Glossary of terms and list of abbreviations

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

Volume 1: Introduction and methodology

This provides:

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

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

Volume 2: Community area reports and map books

These cover the following community areas:

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

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

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

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

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

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

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

Volume 3: Route-wide effects

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

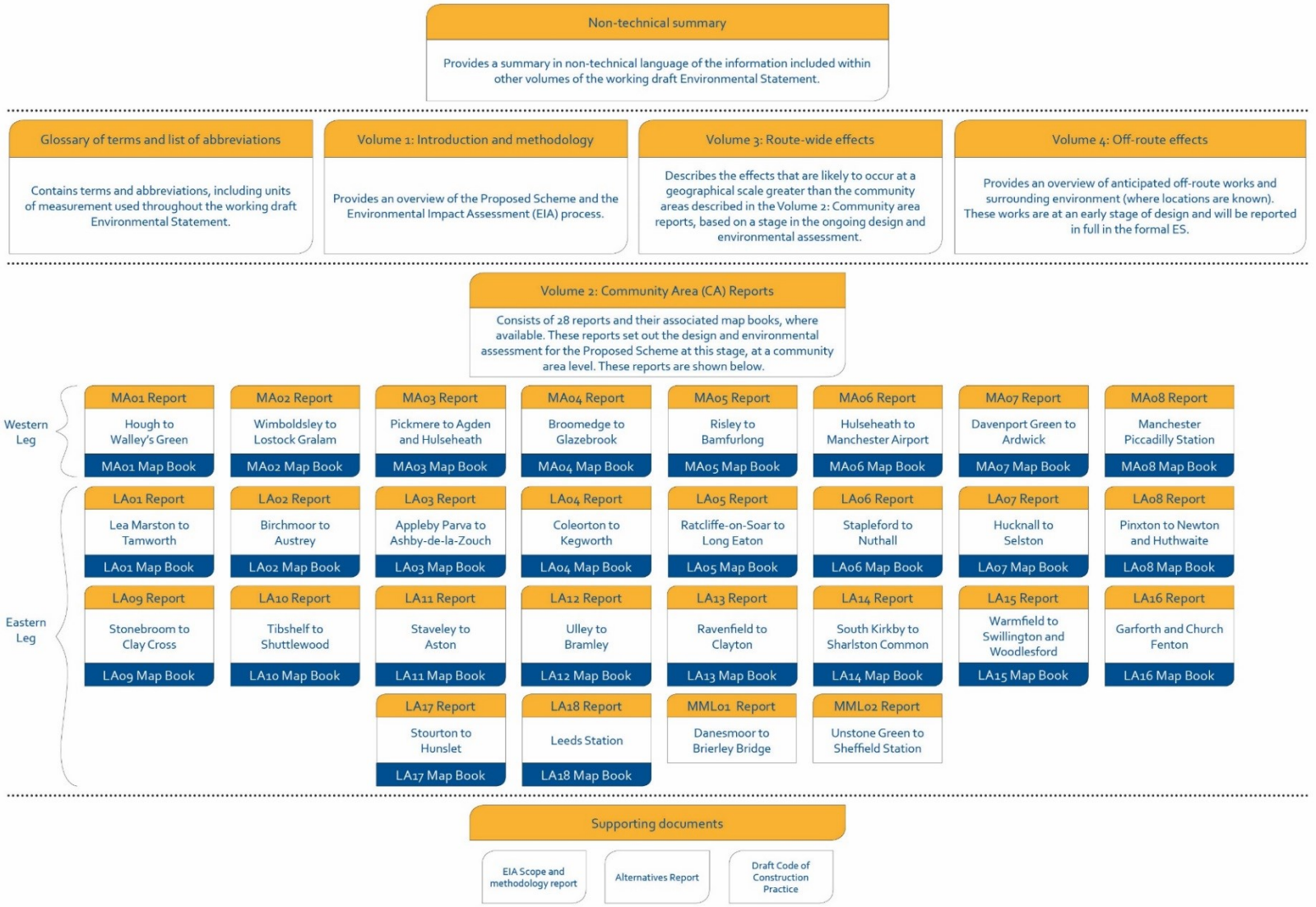
Volume 4: Off-route effects

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

Supporting documents

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

Figure 1: Structure of the working draft Environmental Statement



1 Introduction

1.1 Introduction to HS2

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

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

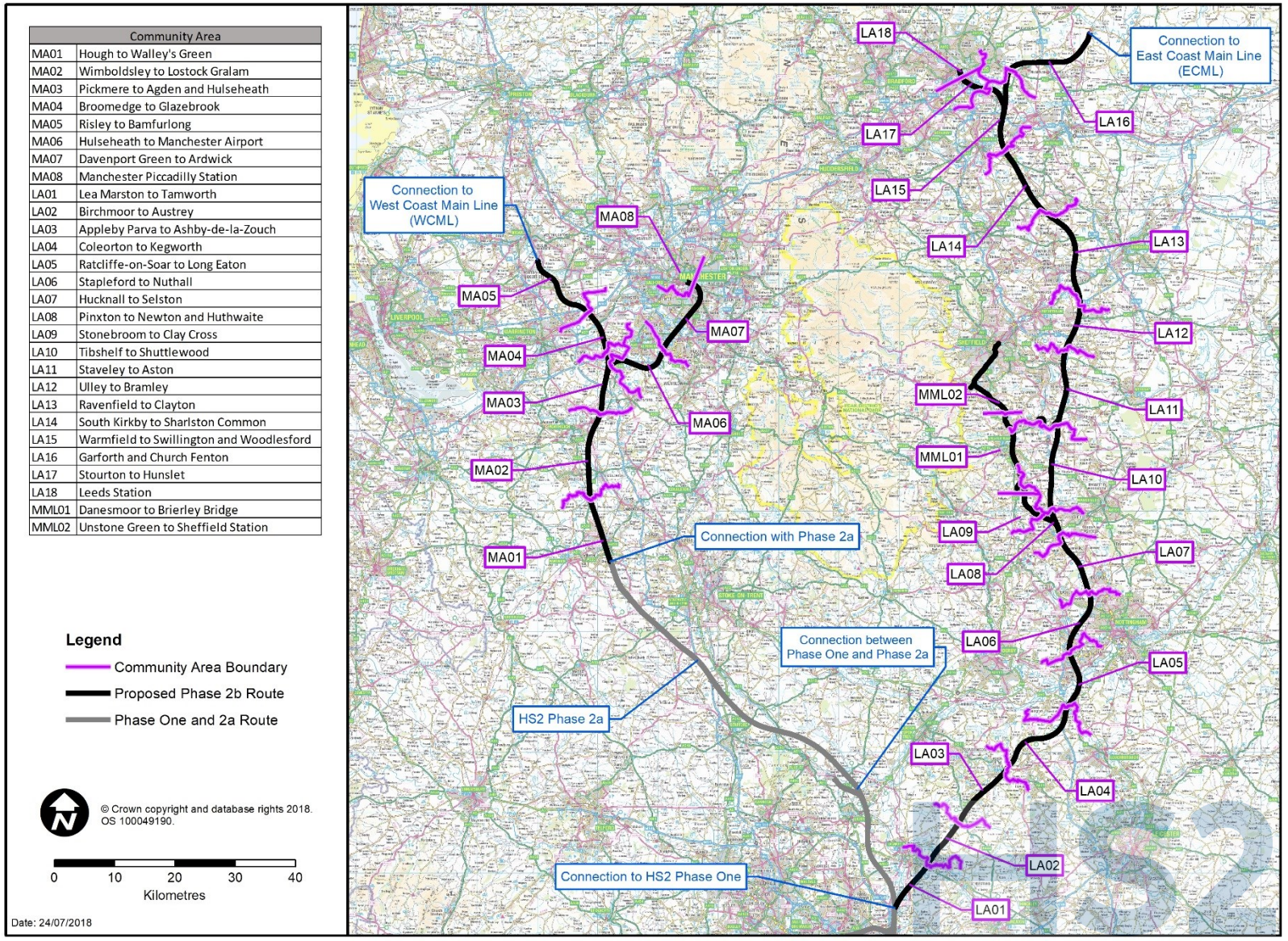
1.1.3 Phase Two of HS2 will extend the route from Phase One in the West Midlands to the north-west to Manchester (approximately 80km (50 miles) with connections to the West Coast Main Line (WCML) at Crewe and Golborne, and to the north-east to Leeds with a connection to the Erewash Valley Line and Midland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

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

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

1.1.6 For environmental assessment and community engagement purposes, the Proposed Scheme has been divided into 28 community areas (CA). These are shown in Figure 2. This CA report relates to the Appleby Parva to Ashby-de-la-Zouch area (LA03) 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 Appleby Parva to Ashby-de-la-Zouch 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;

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

- Section 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;
- 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 Appleby Parva to Ashby-de-la-Zouch area are provided in a separate corresponding document entitled Volume 2: LA03 Map Book, which should be read in conjunction with this report.

[3] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology 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: LA03 Map Book). There is some flexibility during detailed design to alter the horizontal and vertical alignments and other details within the limits shown on the plans and sections submitted to Parliament and as set out in the Bill, and this flexibility is included within the scope of the environmental assessment. Further explanation is provided in Volume 1, Section 1.

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

2 Overview of the area and description of the Proposed Scheme

2.1 Overview of the area

General

2.1.1 The Appleby Parva to Ashby-de-la-Zouch area is a section of the Proposed Scheme that would be approximately 12.8km long and pass through the parishes of Appleby Magna, Oakthorpe, Donisthorpe and Acresford, Measham, Packington and Ashby-de-la-Zouch. This area lies within the local authority areas of North West Leicestershire District Council (NWLDC) and Leicestershire County Council (LeCC). The boundary between Austrey and Appleby Magna parishes forms the southern boundary of this section. The boundary between Ashby-de-la-Zouch and Coleorton parishes forms the northern boundary of this section.

2.1.2 As shown in Figure 3, the Birchmoor to Austrey area (LA02) lies to the south and the Coleorton to Kegworth (LA04) area lies to the north.

Settlement, land use and topography

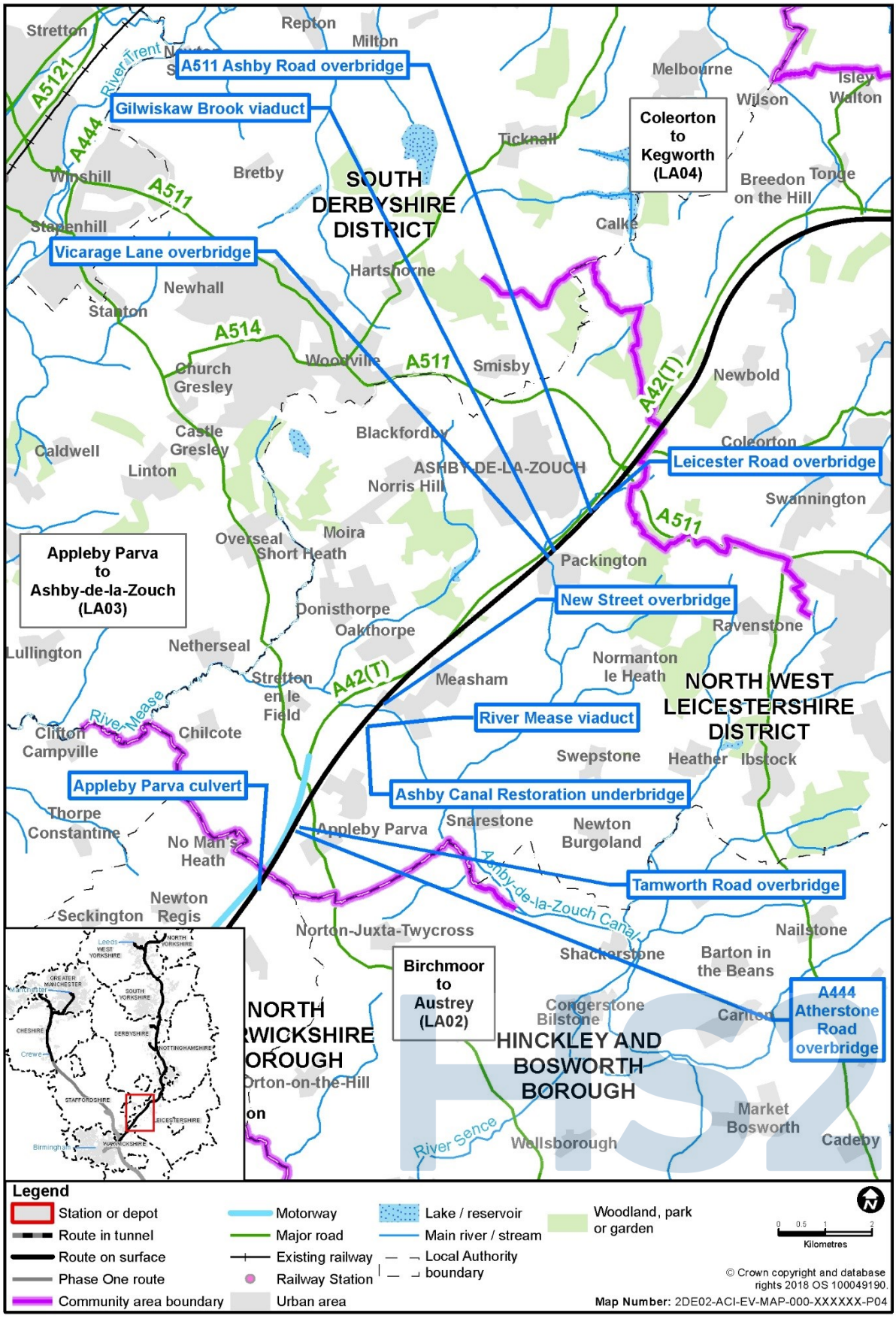
2.1.3 The Appleby Parva to Ashby-de-la-Zouch area is predominantly rural in character, with agriculture being the main land use. This is interspersed with woodland, villages and a scattering of isolated dwellings and farmsteads. The area is characterised by gently undulating lowland with grassland and woodland cover. Settled river valley landscapes and floodplain pasture at lower levels are present around the River Mease and Gilwiskaw Brook.

2.1.4 The following settlements are within the Appleby Parva to Ashby-de-la-Zouch area: Appleby Parva, Appleby Magna, Measham, Oakthorpe, Packington and Ashby-de-la-Zouch.

2.1.5 At the southern end of the Appleby Parva to Ashby-de-la-Zouch area there is agricultural land located to the west of Appleby Parva and Appleby Magna. The land falls from a high point of around 120m AOD at Salt Street to around 80m AOD in the River Mease valley, next to Measham. In this section, The River Mease Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) is located south of Measham. The Westminster Industrial Estate occupies the land adjacent north of the River Mease and south of Measham.

2.1.6 North of Measham there are woodland areas including Parker's Wood and Fiveways Wood, which are part of the National Forest. Ashby Solar Farm is located south-west of Packington. In this section, the landscape gently undulates, rising from approximately 100m AOD at the top of Mease Valley to approximately 160m AOD near Hill Farm, east of Packington.

Figure 3: Community area context map



Key transport infrastructure

2.1.7 The M42 and the A42 run through the Appleby Parva to Ashby-de-la-Zouch area from south-west to north-east. At M42 junction 11, in the vicinity of Appleby Magna, the M42 becomes the A42. The route of the Proposed Scheme would closely follow the alignment of the M42 and A42 throughout the majority of the area.

2.1.8 There are several local roads within Appleby Parva to Ashby-de-la-Zouch area including the A444 Atherstone Road, Tamworth Road, New Street, Measham Road, Ashby Road, Leicester Road, the A511 Ashby Road and the A512 Ashby Road.

2.1.9 The route of the Proposed Scheme would cross several public rights of way (PRoW) including local access roads, bridleways and public footpaths, which provide links between scattered dwellings and villages. The Ivanhoe Way, Ashby Woulds Heritage Trail and the National Cycle Network (NCN) Route 63 pass through Measham to the north of Burton Road. The National Forest Way passes through Packington and continues north to connect to Ivanhoe Way, another long-distance path.

Socio-economic profile

2.1.10 Within the NWLDC area, there is a wide spread of business types reflecting a diverse range of commercial activities. The professional, scientific and technical sector accounts for the largest proportion of businesses (15%)[4], with construction the second largest (11%), followed by business administration and support (9%).

2.1.11 According to the Annual Population Survey (2016)[5], the employment rate within the NWLDC area was 77% (45,500 people) and unemployment in the NWLDC area was 4.3%.

2.1.12 According to the Annual Population Survey (2016) [6], 39.8% of NWLDC area residents aged 16-64 were qualified to National Vocational Qualification Level 4 (NVQ4) and above, while 4.9% of residents had no qualifications.

Notable community facilities

2.1.13 The main concentration of community facilities is in the larger settlements of Measham and Ashby-de-la-Zouch. The hamlet of Appleby Parva and the villages of Appleby Magna, Oakthorpe and Packington provide fewer local services.

2.1.14 Notable community facilities in Appleby Parva include the Appleby Inn Hotel and Restaurant. Notable community facilities in Appleby Magna include shops, restaurants, Appleby Magna post office and St. Michael and All Angels' Church with church hall facility. There are also a number of clubs and organisations including Appleby Magna Cricket Club, Appleby Magna Allotment Society, which includes the Rectory Lane allotment gardens, a football club and a scouts group.

2.1.15 Measham is a village with a range of community groups, such as the Measham Museum and History Group and the Measham Youth Club. The High Street is the main

[4] Office for National Statistics; UK Business count – Local Units 2016. Available online at: https://www.nomisweb.co.uk
[5] Annual Population Survey, (2016), NOMIS; Available online at: http://www.nomisweb.co.uk
[6] Annual Population Survey, (2016), NOMIS; Available online at: http://www.nomisweb.co.uk

shopping area in the village and includes a range of shops, public houses, healthcare facilities and leisure and community facilities including the Measham Leisure Centre and the Measham and District Community Library. Measham also has several community facilities including St. Charles Catholic Primary School, Measham Church of England Primary School, Measham Medical Centre, St. Laurence Church of England Church and Measham Baptist Church. Willesley Park is located in the north of Measham and comprises of Willesley Wood, a fishing lake, a picnic area, a recreational open space and Willesley Park Golf Course.

2.1.16 Packington is located approximately 2.8km north-east of Measham. Packington is a village with a number of active community groups such as Packington Film Group, Packington Horticultural Society and Packington Village Historic Group. Packington provides several community facilities, including Packington Church of England Primary School, Packington Play Group, Packington Memorial Hall, Bethany Ministries Church and the Church of the Holy Rood.

2.1.17 Ashby-de-la-Zouch is town located in the north of the Appleby Parva to Ashby-de-la-Zouch area. The town includes community facilities, such as a library, healthcare facilities, sports and leisure facilities. The town also provides Ashby Willesley Primary School and Manor House School. There are religious and community facilities, including St. Thomas' Church, Ashby Evangelical Church, St. Helen's Church and Ashby-de-la-Zouch Community Centre. A retail park serves Ashby-de-la-Zouch and the surrounding area.

Recreation, leisure and open space

2.1.18 The Appleby Parva to Ashby-de-la-Zouch area is predominantly rural in character, characterised by open space, woodland and farmland. The National Forest contains a number of multi-user trails for walking, cycling and horse riding, which would be crossed by the route of the Proposed Scheme; including the NCN Route 63 at Measham; and the National Forest Way, which is a long-distance footpath that runs through Packington.

2.1.19 The Ashby Canal Restoration project at Measham is located north of Westminster Industrial Estate. There are a number of recreational open spaces within the area, such as a sports ground located west of the Measham Leisure Centre, a recreation ground east of the St. Charles Catholic Primary School at Measham; and a play area and a sports ground at Packington, west of the Church of the Holy Rood. To the north of Measham there are areas of publicly accessible woodland located along the A42, including Fiveways Wood and Willesley Wood, which provide open space for the local community and incorporate a network of paths.

Policy and planning context

Planning framework

2.1.20 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.

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

- the North West Leicestershire Local Plan 2017[7];
- the Leicestershire Minerals Development Framework – Core Strategy and Development Control Policies up to 2021[8];
- the adopted (saved) policies of the Leicestershire Minerals Local Plan Review (2007)[9];
- the Leicestershire and Leicester Waste Development Framework – Core Strategy and Development Control Policies up to 2021[10];
- the adopted (saved) policies of Leicestershire, Leicester and Rutland Waste Local Plan (2007)[11]; and
- Leicestershire Local Transport Plan 3 (2011-2026)[12].

2.1.22 Emerging policies are not considered as part of this assessment unless a development plan has been submitted to the Secretary of State for Examination.

2.1.23 This is the case for the Leicestershire Minerals and Waste Local Plan (2016) which was submitted to the Secretary of State for examination in February 2018[13].

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. Allocations in the submission draft of the Leicestershire Minerals and Waste Local Plan have also been included as committed development. These will be listed in the formal ES.

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

[7] North West Leicestershire District Council (2017), *North West Leicestershire Local Plan*. Available online at: https://www.nwleics.gov.uk/files/documents/adopted_local_plan_2011_20312/Adopted%20Written%20Statement.pdf
[8] Leicestershire County Council (2021), *Leicestershire Minerals Development Framework.* Available online at: https://www.leicestershire.gov.uk/sites/default/files/field/pdf/2016/10/4/Minerals_core_strategy_development_control_policies.pdf
[9] Leicestershire County Council (2007), *Leicestershire Minerals Local Plan Review.* Available online at: https://www.leicestershire.gov.uk/sites/default/files/field/pdf/2016/10/3/Minerals_local_plan_0.pdf
[10] Leicestershire County Council (2021), *Leicestershire & Leicester Waste Development Framework.* Available online at: https://www.leicestershire.gov.uk/sites/default/files/field/pdf/2016/10/4/waste_core_strategy_development_control_policies.pdf
[11] Leicestershire County Council (2007), *Leicestershire, Leicester and Rutland Waste Local Plan 1995-2006.* Available online at: https://www.leicestershire.gov.uk/sites/default/files/field/pdf/2016/10/4/waste_local_plan.pdf
[12] Leicestershire County Council (2011-2026), *Leicestershire Local Transport Plan 3.* Available online at: https://www.leicestershire.gov.uk/sites/default/files/field/pdf/2017/1/9/Local_transport_plan.pdf
[13] Leicestershire County Council Minerals and Waste Local Plan (2016). Available online at: https://www.leicestershire.gov.uk/environment-and-planning/planning/minerals-and-waste-local-plan/submission

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:

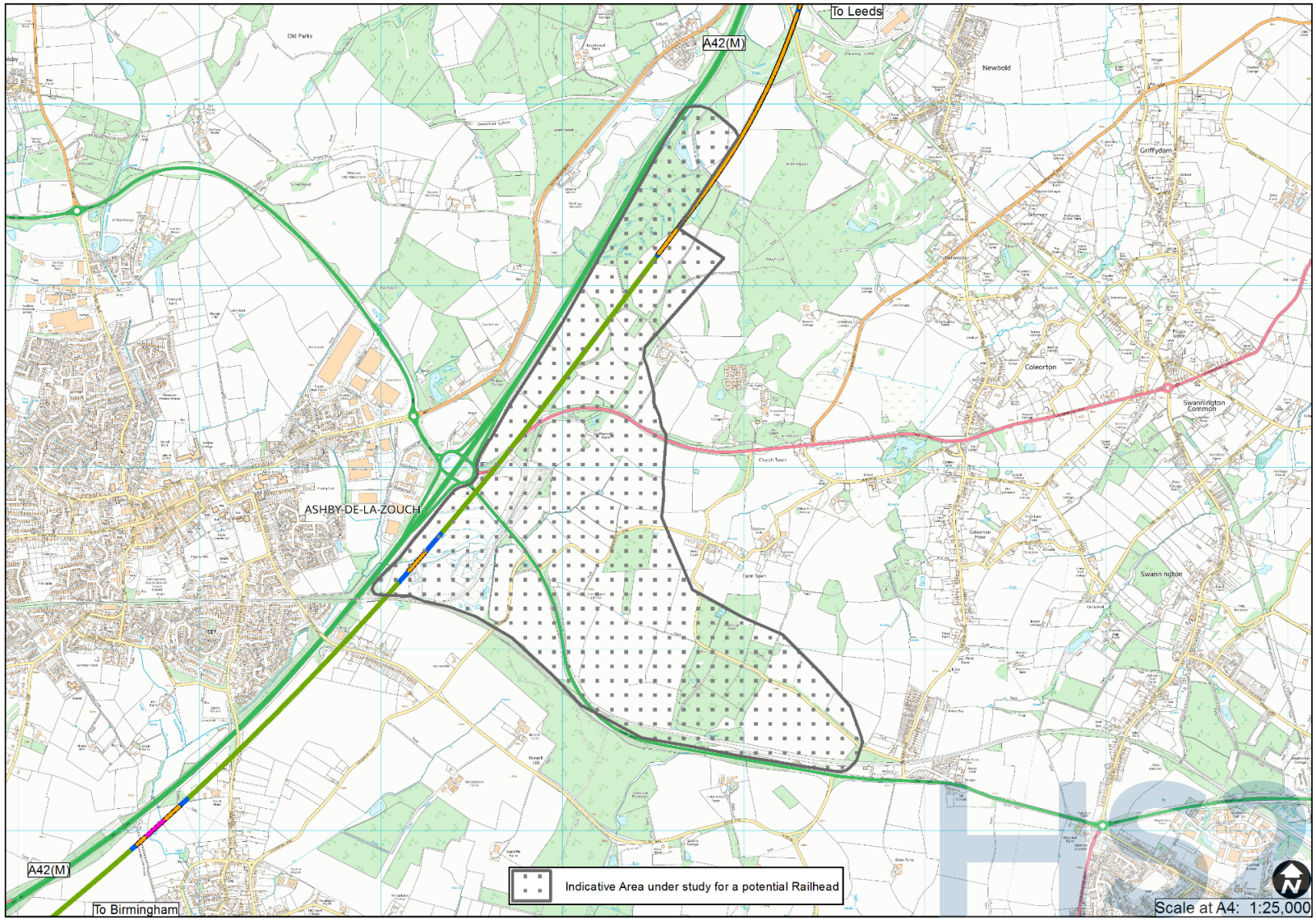
- review of the proposed lengths and heights of viaducts and other river crossing structures and associated replacement floodplain storage areas;
- temporary and permanent utility diversions;
- refinement of the realignment of roads and PRoW that would be crossed by the Proposed Scheme;
- refinement of drainage features required for railway and highways;
- refinement of maintenance access routes and access to balancing ponds;
- additional and refinement of environmental measures required to mitigate likely significant environmental effects;
- location of a proposed temporary railhead and associated compound, see Figure 4;
- refinement of construction compound locations and site haul routes; and
- refinement of auto-transformer station and mid-point auto-transformer station locations.

2.2 Description of the Proposed Scheme

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

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

Figure 4: Indicative area within which a temporary railhead may be located



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 Proposed Scheme through the Appleby Parva to Ashby-de-la-Zouch area would be approximately 12.8km long and would lie within the NWLDC and LeCC local authority areas. The route of the Proposed Scheme would extend from Appleby Parva in the south and travel north towards Measham and on to Ashby-de-la-Zouch.

2.2.5 This section of route is illustrated in the Volume 2: LA03 Map Book, CT-06-412b to CT-06-419a.

2.2.6 All dimensions in the sections below are approximate.

2.2.7 In the Appleby Parva to Ashby-de-la-Zouch area, the route of the Proposed Scheme would be carried on the following features:

- viaducts for a total length of 730m (River Mease and Gilwiskaw Brook viaducts);
- cuttings for a total length of 9.7km (Salt Street [continuing from the Birchmoor to Austrey area], Appleby Parva, Appleby Magna, A42 Measham, Willesley Wood Side, Measham Road Packington, Ashby-de-la-Zouch No.1 and Ashby-de-la-Zouch No.2 [continuing in the Coleorton to Kegworth area] cuttings); and
- embankments for a total length of 2.4km (Appleby Parva, Appleby Magna No.1, Appleby Magna No.2, Measham No.1, Measham No.2, Measham Road Packington, Ashby-de-la-Zouch and New Packington embankments).

2.2.8 Embankments and cuttings have been labelled according to their predominant physical characteristics. It is important to note that embankments and cuttings may vary as to their depth of cutting or height of embankment, as a result of the topography through which the railway passes. In the Appleby Parva to Ashby-de-la-Zouch area, there would be a section of cutting that would be above ground level. This applies to the Measham Road Packington cutting, which would have a short section of embankment that would be 5m above existing ground level and 80m in length.

2.2.9 The Proposed Scheme is described in eight separate sections below.

2.2.10 In general, features are described along the route of the Proposed Scheme from south to north and west to east as they cross the Proposed Scheme, as shown on Map Series CT-06 in the Volume 2: LA03 Map Book.

Salt Street cutting to Appleby Magna embankment No.1

2.2.11 The route of the Proposed Scheme would continue from the Birchmoor to Austrey area north-east towards Appleby Parva in the Salt Street cutting. The route would continue northwards on the Appleby Parva embankment and in the Appleby Parva cutting, west of Appleby Parva.

2.2.12 This section of route is illustrated in the Volume 2: LA03 Map Book, CT-06-412b.

2.2.13 Key features of this approximately 1.5km section would include:

- Salt Street cutting, the first 396m of which would be located in the Birchmoor to Austrey area (LA02). The remaining 345m would be within the Appleby Parva to Ashby-de-la-Zouch area with associated landscape earthworks to provide acoustic and visual screening for residents of South Hill Farm, Westhill Farm and Appleby Parva (see Volume 2: Map CT-06-412b, A5 to E6);
- Appleby Parva embankment, 580m in length and up to 3m in height, with associated landscape earthworks on the east side to provide acoustic and visual screening for residents of Appleby Parva, Appleby Magna and surroundings areas (and incorporating landscape planting) (see Volume 2: Map CT-06-412b, D5 to F6);
- closure of Dingle Lane on both sides of the Proposed Scheme (see Volume 2: Map CT-06-412b, D4 to F7);
- diversion of the Leicestershire Bridleway Q19/3 to the south of its existing alignment for 650m, to connect to Salt Street to the realigned Leicestershire Byway Q4a/3 and cross the route of the Proposed Scheme over Salt Street overbridge. Salt Street overbridge and Leicestershire Byway Q4a/3 are described in Volume 2: Community Area report, LA02, Birchmoor to Austrey (see Volume 2: Map CT-06-412b, B6 and E6);
- Appleby Parva culvert, at Dingle Lane , for surface water drainage under the route of the Proposed Scheme (see Volume 2: Map CT-06-412b, E5 and E6);
- Appleby Parva cutting, 601m in length, up to 45m in width and up to 4m deep, with associated landscape earthworks on the east side to provide acoustic and visual screening for residents of Appleby Parva, Appleby Magna and surroundings (and incorporating landscape planting) (see Volume 2: Map CT-06-412b, F5 to J6); and
- landscape mitigation planting and an area of grassland habitat creation on the west side of the Proposed Scheme to integrate the Proposed Scheme into the surrounding landscape (see Volume 2: maps CT-06-412b, E6 to CT-06-413, C5).

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

2.2.15 Construction of this section would be managed from the Salt Street satellite compound and Atherstone Road main compound, which are described in Section 2.3, and shown on Map CT-05-412b and Map CT-05-413 in the Volume 2: LA03 Map Book.

Appleby Magna embankment No.1 to Appleby Magna embankment No.2

2.2.16 The route of the Proposed Scheme would continue north towards Measham onto Appleby Magna embankment No.1 and into Appleby Magna cutting, passing to the west of Appleby Magna.

2.2.17 This section of route is illustrated in the Volume 2: LA03 Map Book, maps CT-06-413b to CT-06-414.

2.2.18 Key features of this approximately 2.4km section would include:

- Appleby Magna embankment No.1, 305m in length and up to 1m in height, with associated landscape earthworks on the east side to provide acoustic and visual screening for residents of Appleby Parva, Appleby Magna and surrounding areas (and incorporating landscape planting) (see Volume 2: Map CT-06-413, A5 to C6);
- a balancing pond for land drainage, located to the west of the Proposed Scheme, with access provided from a track connecting 950m south to Dingle Lane (see Volume 2: maps CT-06-412b, J4 to J5, to CT-06-413, A4 to B5);
- Appleby Magna cutting, 2.1km in length, 70m in width and up to 10m deep, with associated landscape planting on both sides of the Proposed Scheme to integrate the Proposed Scheme into the surrounding landscape (see Volume 2: maps CT-06-413, B5 to CT-06-414, D6);
- realignment of the A444 Atherstone Road on both sides of the Proposed Scheme, with associated landscape planting to help integrate the Proposed Scheme into the surrounding landscape. The A444 Atherstone Road would be realigned 60m north-east of its existing alignment by up to 726m in length and would cross the route of the Proposed Scheme on the new A444 Atherstone Road overbridge. The overbridge would be 83m in length and up to 10m in height above track level (see Volume 2: Map CT-06-413, A8 to D4);
- realignment of the access to the Motorway Service Area on the west of the Proposed Scheme, at junction 11 of the M42. The realigned access would be provided from the realigned A444 Atherstone Road (see Volume 2: Map CT-06-413, C4 to D5);
- realignment of the access to the Appleby Park Hotel to the west of the Proposed Scheme, at junction 11 of the M42. The realigned access would be provided from the realigned A444 Atherstone Road and the realigned Tamworth Road (see Volume 2: Map CT-06-413, C4 to D5);
- balancing pond for highway drainage, located to the east of the Proposed Scheme with access from the realigned A444 Atherstone Road and Bowleys Lane (see Volume 2: Map CT-06-413, B7);
- diversion of Leicestershire Footpath Q12/1 to the south of its existing alignment for 320m, to connect to Bowleys Lane and continue west along Bowleys Lane to connect to the A444 Atherstone Road (see Volume 2: Map CT-06-413, B7 to C6);
- diversion of Leicestershire Footpath Q13/1 north of its existing alignment for 15m, to connect to the diverted Rectory Lane (see Volume 2: Map CT-06-413, D7 to E6);

- diversion of Rectory Lane, to the east of the Proposed Scheme, with associated landscape planting to help integrate the Proposed Scheme into the surrounding landscape. The diversion would be 325m in length, 120m north of its existing alignment, and would connect to Tamworth Road (see Volume 2: Map CT-06-413, E6 to E8);
- a balancing pond for highway drainage, located to the east of the route of the Proposed Scheme, with access from the diverted Rectory Lane (see Volume 2: Map CT-06-413, D7 and E8);
- realignment of Tamworth Road, 100m north-east of its existing alignment and 1.2km in length, with associated landscape planting to help integrate the Proposed Scheme into the surrounding landscape. The realigned Tamworth Road would start at junction 11 of the M42 and would pass over the route of the Proposed Scheme on the new Tamworth Road overbridge (see Volume 2: Map CT-06-413, D3 to I7);
- Tamworth Road overbridge, 99m in length and up to 9m in height above track level, to carry the realigned Tamworth Road across the route of the Proposed Scheme (see Volume 2: Map CT-06-413, E5);
- two balancing ponds to provide highway drainage, one on each side of the Proposed Scheme in an area of landscape planting to help integrate the Proposed Scheme into the surrounding landscape. Access would be provided from the realigned Tamworth Road (see Volume 2: Map CT-06-413, D3 to D4 and H6 to I7);
- diversion of Leicestershire Footpath Q3/1 to the west of its existing alignment for 600m, to connect to the realigned Tamworth Road and crossing the Proposed Scheme on the new Tamworth Road overbridge to connect to the diverted Leicestershire Footpath Q3/2 (see Volume 2: Map CT-06-413, D4 to F8);
- diversion of Leicestershire Footpath Q3/2 to the south-west of its existing alignment for 510m, to connect to the diverted Leicestershire Footpath Q3/1 (see Volume 2: Map CT-06-413, D4 to G4);
- diversion of the accommodation access for Manor House Farm, located to the west of the Proposed Scheme, which would be provided from the realigned Tamworth Road (see Volume 2: Map CT-06-413, D4 to J5);
- Appleby Magna auto-transformer station, 50m by 25m, on the western side of the route of the Proposed Scheme and 250m south of Manor House Farm. Access would be provided via the diverted Manor House Farm accommodation access to the south-west (see Volume 2: Map CT-06-413, I5); and
- nine ecological mitigation ponds to the east of the route of the Proposed Scheme with surrounding terrestrial habitat to provide replacement habitat and ecological connectivity adjacent to Georgina's Wood (see Volume 2: Map CT-06-413, H7 to I8).

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

2.2.20 Construction of this section would be managed from the Atherstone Road main compound, Appleby Magna south satellite compound and Appleby Magna north satellite compound, which are described in Section 2.3, and shown on Map CT-05-413 in the Volume 2: LA03 Map Book.

Appleby Magna embankment No.2 to A42 Measham cutting

2.2.21 The route of the Proposed Scheme would continue north-east towards Measham on Appleby Magna embankment No.2, continuing on the River Mease viaduct and on to Measham embankment No.1, passing west of the south edge of Measham.

2.2.22 This section of route is illustrated in the Volume 2: LA03 Map Book, maps CT-06-414 to CT-06-415.

2.2.23 Key features of this approximately 1km section would include:

- Appleby Magna embankment No.2, 294m in length and up to 18m in height, with associated landscape planting to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: Map CT-06-414, D6 to F5);
- a balancing pond for railway drainage west of the Proposed Scheme with access via an existing unnamed road under the A42 (see Volume 2: Map CT-06-414, E4 to E5);
- a replacement floodplain storage area on the east side of the Proposed Scheme in the River Mease Valley, adjacent to the River Mease viaduct (see Volume 2: Map CT-06-414, F6);
- River Mease viaduct, 585m in length and up to 19.4m in height above ground level (Burton Road). The viaduct would span over the River Mease and its floodplain, Repton Road, Huntingdon Way, Burton Road and NCN Route 63 (see Volume 2: Map CT-06-414, F6 to I6);
- a noise fence barrier, 1.2km in length and up to 3m in height, extending from the southern extent of Appleby Magna embankment No. 2 in to the A42 Measham cutting, to provide acoustic screening for properties in Measham (see Volume 2: Map CT-06-414, D6 to F6);
- an area of wetland and grassland habitat creation on both sides of the Proposed Scheme, extending east and west under the River Mease viaduct, to provide replacement habitat (see Volume 2: Map CT-06-414, D1 to G10);
- Ashby Canal Restoration underbridge, 19m in length with a height clearance of 5m below track level, under the route of the Proposed Scheme, 2m north-east of Burton Road, at Measham (see Volume 2: Map CT-06-414, F6);

- Measham embankment No.1, 119m in length and up to 5m in height, with associated landscape planting to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: maps CT-06-414, I6 to CT-06-415 A6); and
- diversion of Leicestershire Footpath P81/1 to the south of its existing alignment for 400m, from the realigned Leicestershire Footpath P69/4 south-west to connect with NCN Route 63 (see Volume 2: maps CT-06-414, I6 to CT-06-415, C6).

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

2.2.25 Construction of this section would be managed from the Atherstone Road main compound, River Mease viaduct south satellite compound, River Mease viaduct north satellite compound, New Street overbridge satellite compound and B4116 main compound, which are described in Section 2.3, and shown on Map CT-05-413 and Map CT-05-414 in the Volume 2: LA03 Map Book.

A42 Measham cutting to Measham embankment No.2

2.2.26 The route of the Proposed Scheme would continue north-east towards Packington. This part of the route would run in the A42 Measham cutting, with Oakthorpe to the west and Measham to the east.

2.2.27 This section of route is illustrated in the Volume 2: LA03 Map Book, maps CT-06-414 to CT-06-416.

2.2.28 Key features of this approximately 1.6km section would include:

- A42 Measham cutting 1.6km in length, 55m in width and up to 7m deep with associated landscape planting on both sides to help integrate the Proposed Scheme into the surrounding landscape. There would also be landscape earthworks on the east side to provide acoustic and visual screening to residents of Measham, Windsor Way and residential properties located on Ashby Road (see Volume 2: maps CT-06-414, I6 to CT-06-415, A6 to I6);
- a balancing pond for railway drainage west of the Proposed Scheme, which would be located within an area of landscape planting to help integrate the Proposed Scheme into the surrounding landscape, with access via Burton Road (see Volume 2: maps CT-06-414, I5 to CT-06-415, B6);
- a noise fence barrier, 750m in length and up to 3m in height, at the top of the A42 Measham cutting, extending from the River Mease to Windsor Way, to provide acoustic screening for properties in Measham (see Volume 2: maps CT-06-414, F6 to J6 and CT-06-415, A6 to F6);

- diversion of Leicestershire Footpath P75/6 to the south of its existing alignment for 520m, from the Leicestershire Footpath P75/6 south-west to connect to the NCN Route 63 (Burton-on-Trent to Wisbech) (see Volume 2: maps CT-06-414, H3 to CT-06-415, B4);
- closure of Leicestershire Footpath P75/5 where it would cross the route of the Proposed Scheme, users would be permanently diverted to the realigned Leicestershire Footpath P69/4 and Leicestershire Footpath P81/1 (see Volume 2: maps CT-06-414, I6 to CT-06-415, C6);
- closure of Leicestershire Footpath P67/5 where it would cross the route of the Proposed Scheme, users would be permanently diverted to the realigned Leicestershire Footpath P69/4 and Leicestershire Footpath P81/1 (see Volume 2: maps CT-06-414, I6 to CT-06-415, C6);
- realignment of Leicestershire Footpath P69/4 to the south-east of Leicestershire Footpath 69/5 for 120m to connect to the Leicestershire Footpath P81/1 (see Volume 2: maps CT-06-414, I6 to CT-06-415, C6);
- realignment of the A42 to the west of the Proposed Scheme with associated landscape planting to help integrate the Proposed Scheme into the surrounding landscape. The realignment would be 2.1km in length and 70m west of its existing alignment (see Volume 2: Map CT-06-414, I4 to CT-06-416, B5);
- realignment of New Street on both sides of the route of the Proposed Scheme, 620m in length, from Oakthorpe to Measham, with associated landscape planting to help integrate the Proposed Scheme in the surrounding landscape (see Volume 2: Map CT-06-415, D3 to E7);
- New Street overbridge, 147m in length and up to 10m in height above track level and up to 5.7m in height above the A42 to carry the realigned New Street over the Proposed Scheme (see Volume 2: Map CT-06-415, D5 to E6);
- New Street retaining wall, 85m in length and entirely below ground level, located to the east of the route of the Proposed Scheme, north of New Street. The retaining wall would provide structural support to the Proposed Scheme (see Volume 2: Map CT-06-415, E6 and E7);
- access to Windsor Way, located to the east of the Proposed Scheme, which would be provided from the realigned New Street (see Volume 2: Map CT-06-415, E7); and
- an area of woodland habitat creation to the east of the route of the Proposed Scheme, at Fiveways Wood, which would help maintain ecological connectivity between areas of deciduous woodland (see Volume 2: maps CT-06-415, H6 to CT-06-416, A8).

2.2.29 This section of the route would not include any maintenance access points. 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.

2.2.30 Construction of this section would be managed from the River Mease viaduct north satellite compound, New Street overbridge satellite compound and B4116 main compound, which are described in Section 2.3, and shown on Map CT-05-414 to Map CT-05-416 in the Volume 2: LA03 Map Book.

Measham embankment No.2 to Measham Road Packington embankment

2.2.31 The route of the Proposed Scheme would continue north towards Packington onto Measham embankment No.2 and into Willesley Wood Side cutting passing south-west of Packington.

2.2.32 This section of route is illustrated in the Volume 2: LA03 Map Book, maps CT-06-415 to CT-06-416.

2.2.33 Key features of this approximately 1.4km section would include:

- Measham embankment No.2, 301m in length and up to 3m in height, with associated landscape planting on both sides to help integrate the Proposed Scheme into the surrounding landscape, and landscape earthworks on the east side to provide acoustic and visual screening to residents of properties located on Ashby Road (see Volume 2: maps CT-06-415, I6 to CT-06-416, B6);
- Willesley Wood Side cutting, 1.1km in length, 175m in width and up to 22m deep with landscape planting on both sides to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: Map CT-06-416, B6 to H6);
- diversion of Leicestershire Footpath P1/1 to the east of its existing alignment for 1.5km, from the existing Leicestershire Footpath P1/1 to the north-east to run north crossing the Proposed Scheme over B4116 Measham Road overbridge. Leicestershire Footpath P1/1 would continue west along the Willesley Wood Side diversion to connect to the Leicestershire Bridleway P8/2 (see Volume 2: Map CT-06-416, B6 to G5);
- closure of the Leicestershire Bridleway P8/1 where it would cross the Proposed Scheme. Users would be diverted from Leicestershire Bridleway P8/2 along Willesley Woodside diversion (see Volume 2: Map CT-06-416, D4 to G6);
- diversion of Willesley Wood Side, on the western side of the route of the Proposed Scheme, with associated landscape planting to help integrate the Proposed Scheme into the surrounding landscape. The diversion would be by 450m in length, 350m north of its existing alignment, from the existing overbridge over the A42, to connect to the B4116 Measham Road, south of junction 12 (see Volume 2: Map CT-06-416, E4 to G5);
- three ecological mitigation ponds to the west of the route of the Proposed Scheme with surrounding terrestrial habitat to provide replacement habitat

and ecological connectivity adjacent to Willesley Wood Side diversion newts (see Volume 2: Map CT-06-416, D4 to F5);

- a balancing pond for highway drainage to the west of the Proposed Scheme, with access from the diverted Willesley Wood Side (see Volume 2: Map CT-06-416, G4); and
- B4116 Measham Road overbridge, 95m in length and up to 11m in height above track level, to carry B4116 Measham Road across the route of the Proposed Scheme on its existing alignment (see Volume 2: Map CT-06-416, F6 to G5).

2.2.34 This section of the route would include two maintenance access points allowing vehicle access to the route of the Proposed Scheme. There would also be maintenance access routes 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.

2.2.35 Construction of this section would be managed from the B4116 main compound, which is described in Section 2.3, and shown on Map CT-05-416, in the Volume 2: LA03 Map Book.

Measham Road Packington embankment to Ashby-de-la-Zouch cutting No.1

2.2.36 The route of the Proposed Scheme would continue north on Measham Road Packington embankment and in Measham Road Packington cutting, followed by Gilwiskaw Brook viaduct and Ashby-de-la-Zouch embankment, west of Packington.

2.2.37 This section of route is illustrated in the Volume 2: LA03 Map Book, maps CT-06-416 to CT-06-417.

2.2.38 Key features of this approximately 1.4km section would include:

- Measham Road Packington embankment, 340m in length and up to 4m in height with associated landscape planting to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: Map CT-06-416, H5 to I6);
- Measham Road Packington culvert, 370m north of the B4116 Measham Road, for surface water drainage under the route of the Proposed Scheme (see Volume 2: Map CT-06-416, I5 and I6);
- Packington mid-point auto-transformer station, 60m by 25m, on the western side of the route of the Proposed Scheme, 590m north of the B4116 Measham Road. Access would be provided via an access road from the B4116 Measham Road to the south-west (see Volume 2: maps CT-06-416, G5 to I5 to CT-06-417, A5);
- Measham Road Packington cutting, 795m in length, 130m in width and up to 16m in depth with associated landscape planting to help integrate the Proposed Scheme into the surrounding landscape, landscape earthworks on its

north-east edge to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: Map CT-06-417, A6 to E6);

- realignment of Leicestershire Footpath O68/4 to the south-east of its existing alignment for 900m to connect to the B4116 Measham Road, and pass over the route of the Proposed Scheme on the new B4116 Measham Road overbridge where it would to connect with the existing Leicestershire Footpath O68/4 to the west of the route of the Proposed Scheme (see Volume 2: Map CT-06-416, F6 to I6);
- a noise fence barrier, 690m in length and up to 2m in height, extending from Vicarage Lane overbridge to Beech House, to provide acoustic screening for properties in Packington (see Volume 2: Map CT-06-417, D6 to G5);
- realignment of Vicarage Lane 170m south of its existing alignment, 504m in length with associated landscape planting to help integrate the Proposed Scheme into the surrounding landscape. Vicarage Lane would pass over the Proposed Scheme on the new Vicarage Lane overbridge (see Volume 2: Map CT-06-417, D5 to E6);
- Vicarage Lane overbridge, 65m in length and up to 11m in height above track level, to carry the realigned Vicarage Lane across the route of the Proposed Scheme (see Volume 2: Map CT-06-417, D5 and D6);
- realignment of Leicestershire Bridleway O70/1 to the south-west of its existing alignment for 400m, to pass over the route of the Proposed Scheme on the new Vicarage Lane overbridge (see Volume 2: Map CT-06-417, D5 and E6);
- diversion of Leicestershire Footpath O71/2 to the south-west of its existing alignment for 270m, from the Leicestershire Footpath O75/1 to pass under the Gilwiskaw Brook viaduct and to connect to Leicestershire Footpath O71/3 to the west of the Proposed Scheme (see Volume 2: Map CT-06-417, F6);
- realignment of Leicestershire Footpath O74/2 to the north of its existing alignment for 390m, from the Leicestershire Footpath O75/1 south-west to run along the access road to the balancing pond to connect with the realigned Leicestershire Footpath O71/2 to the west of the Proposed Scheme (see Volume 2: Map CT-06-417, F6);
- Gilwiskaw Brook viaduct, 144m in length and up to 4.9m in height above ground level, over the Gilwiskaw Brook and its floodplain (see Volume 2: Map CT-06-417, E6 and F6);
- realignment of Gilwiskaw Brook for up to 131m, under the Gilwiskaw Brook viaduct (see Volume 2: Map CT-06-417, E6 to F5);
- a replacement floodplain storage area on the west side of the route of the Proposed Scheme in the Gilwiskaw Brook Valley, adjacent to the Gilwiskaw Brook viaduct (see Volume 2: Map CT-06-417, F5);
- an area of wetland and grassland habitat creation on both sides of the Proposed Scheme, extending east and west under the Gilwiskaw Brook

viaduct to provide replacement habitat (see Volume 2: Map CT-06-417, E5 to G8);

- Ashby-de-la-Zouch embankment, 138m in length and up to 3m in height (see Volume 2: Map CT-06-417, F5 and F6); and
- two balancing ponds for railway drainage east of the Proposed Scheme within an area of grassland habitat creation to help integrate the Proposed Scheme into the surrounding landscape. The balancing pond located south of Gilwiskaw Brook would be accessed via Vicarage Lane, and the balancing pond located north of the river would be accessed via Ashby Road (see Volume 2: Map CT-06-417, E6 to G7).

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

2.2.40 Construction of this section would be managed from the B4116 main compound, Vicarage Lane overbridge compound and Gilwiskaw Brook viaduct satellite compound, which are described in Section 2.3, and shown on Map CT-05-416 and Map CT-05-417 in the Volume 2: LA03 Map Book.

Ashby-de-la-Zouch cutting No.1 to Ashby-de-la-Zouch cutting No.2

2.2.41 The route of the Proposed Scheme would continue north towards Coleorton in Ashby-de-la-Zouch cutting No.1 and on New Packington embankment, passing west of New Packington and east of Ashby-de-la-Zouch.

2.2.42 This section of route is illustrated in the Volume 2: LA03 Map Book, maps CT-06-417 to CT-06-418a.

2.2.43 Key features of this approximately 2.1km section would include:

- Ashby-de-la-Zouch cutting No.1, 1.8km in length, 95m in width and up to 10m in depth, with landscape earthworks on the east side of the route of the Proposed Scheme in its southern section to provide visual screening to residents of Beech House and of Packington and in its northern section to provide noise screening to residents of Packington. Ashby-de-la-Zouch cutting No.1 would also have landscape earthworks on the west side of the Proposed Scheme in its northern section to provide acoustic screening to residents of Ashby-de-la-Zouch and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: Map CT-06-417, G5 to CT-06-418a, F6);
- diversion of the Leicestershire Footpath O72/1 to connect to the realigned Leicestershire Bridleway P20/1 (see Volume 2: maps CT-06-417, H6 to J6 and CT-06-418a, A6 to D6);
- realignment of Leicestershire Bridleway P20/1 to the east of its existing alignment for 1.3km, from Ashby Road to connect to Leicester Road (see Volume 2: maps CT-06-417, I6 to J6 and CT-06-418a, A6 to D6);

- Ashby Road south overbridge, 95m in length and up to 9m in height above track level, to carry Ashby Road over the route of the Proposed Scheme on its existing alignment for 400m in length (see Volume 2: Map CT-06-417, H5 and I5);
- a balancing pond for land drainage east of the Proposed Scheme within an area of landscape planting to help integrate the Proposed Scheme into the surrounding landscape, with access via Ashby Road (see Volume 2: Map CT-06-417, H6 to I7);
- Leicester Road overbridge, 85m in length and up to 11m in height above track level, connecting to the existing overbridge over the A42 and to carry Leicester Road over the route of the Proposed Scheme on its existing alignment (see Volume 2: Map CT-06-418a, D5 and E6);
- thirty-eight ecological mitigation ponds to the east of the route of the Proposed Scheme with surrounding terrestrial habitat to provide replacement habitat and ecological connectivity adjacent to Leicester Road (see Volume 2: Map CT-06-418a, E10 to G7);
- Leicester to Burton upon Trent Line Railway overbridge, 37m in length and up to 10m in height above track level. For the route of Proposed Scheme to pass under the Leicester to Burton upon Trent Line (see Volume 2: Map CT-06-418a, F6); and
- New Packington embankment, 289m in length and up to 1m in height, with associated landscape planting and grassland habitat creation on the west side to help integrate the Proposed Scheme into the surrounding landscape and provide habitat creation (see Volume 2: Map CT-06-418a, H6).

2.2.44 This section of the route would include two maintenance access points allowing vehicle access to the route of the Proposed Scheme. There would also be maintenance access routes 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.

Construction of this section would be managed from the B4116 main compound, Ashby Road south overbridge satellite compound, Gilwiskaw Brook viaduct satellite compound, Leicester Road overbridge satellite compound and Junction 13 main compound, which are described in Section 2.3, and shown on maps CT-05-416 to CT-05-419a, in the Volume 2: LA03 Map Book.

Ashby-de-la-Zouch cutting No.2

2.2.45 The route of the Proposed Scheme would continue north-east towards Coleorton in Ashby-de-la-Zouch cutting No.2 to the end of the Appleby Parva to Ashby-de-la-Zouch area.

2.2.46 This section of route is illustrated in the Volume 2: LA03 Map Book, maps CT-06-418a to CT-06-419.

2.2.47 Key features of this approximately 1.5km section are:

- Ashby-de-la-Zouch cutting No.2, 2km in length, up to 180m in width and up to 20m in depth, with associated landscape planting on the west side to help integrate the Proposed Scheme into the surrounding landscape. The first 1.5km would be located in the Appleby Parva to Ashby-de-la-Zouch area and the remaining 460m would be in the Coleorton to Kegworth area (see Volume 2: maps CT-06-418a, H6 to CT-06-419, J6);
- realignment of tributary 2 to Coleorton Brook for up to 505m, under the route of the Proposed Scheme via the New Packington culvert, 370m south of the A511 Ashby Road (see Volume 2: Map CT-06-418a, G5 to I7);
- A511 Ashby Road overbridge, 44m in length and up to 11m in height above track level, to carry the A511 Ashby Road over the route of the Proposed Scheme on its existing alignment (see Volume 2: Map CT-06-419a, B5 to B7);
- realignment of the A512 Ashby Road, 1.2km in length, to the east of the Proposed Scheme and 230m to the south of its existing alignment. The first 300m of the realignment would be located in the Appleby Parva to Ashby-de-la-Zouch area (LA03) and the remaining 800m would be in the Coleorton to Kegworth area. The realignment would run from junction 13 of the A42 to pass over the Proposed Scheme on the A512 Ashby Road overbridge and to continue east for 1.1km (see Volume 2: maps CT-06-419a, B6 to F10, CT-06-419a-R1, D1 to F4 and CT-06-419b B6 to F10);
- A512 Ashby Road overbridge, 74m in length and up to 11m in height above track level, to carry the realigned A512 Ashby Road over the route of the Proposed Scheme (see Volume 2: Map CT-06-419a, B6 to C6);
- access to the Strategic Rail Freight Terminal (SRFT) development site, to the east of the Proposed Scheme, via the realigned A512 Ashby Road (see Volume 2: Map CT-06-419a, B8to D7);
- SRFT underbridge, 19m in length with a height clearance of 6m, to carry the access road to the SRFT development site under the realigned A512 Ashby Road (see Volume 2: Map CT-419a, C7);
- an area of woodland habitat creation to the east of the Proposed Scheme, extending from the realigned A512 Ashby Road to Melbourne Road in the Coleorton to Kegworth area to maintain ecological connectivity between designated areas, including areas of deciduous woodland and Rough Park Registered Park and Garden (see Volume 2: maps CT-06-419a, C7 to CT-06-419a-R1, D1 to F1 and to CT-06-419a, J6);
- closure of the Leicestershire Footpath M60/2 where it would cross the Proposed Scheme. Users would be diverted to the realigned Leicestershire Footpath M60/3 (see Volume 2: Map CT-06-419a, D6 to D7);
- realignment of Leicestershire Footpath M60/3 to the east of its existing alignment for 370m, to connect to the realigned A512 Ashby Road where it

would connect to the diverted Leicestershire Footpath M30/1 (see Volume 2: Map CT-06-419a, D8); and

- diversion of Leicestershire Footpath M30/1 to the north-east of its existing alignment for 790m, from the realigned Leicestershire Footpath M60/3 to connect to the existing alignment of Leicestershire Footpath M30/1, west of Hall Farm (see Volume 2: Map CT-06-419a, D10 to H7).

2.2.48 This section of the route would include two maintenance access points allowing vehicle access to the route of the Proposed Scheme. There would also be maintenance access routes 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.

2.2.49 Construction of this section would be managed from the A511 and A512 overbridges satellite compound and Junction 13 main compound, which are described in Section 2.3, and shown on Map CT-05-419a, in the Volume 2: LA03 Map Book.

Demolitions

2.2.50 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.

2.2.51 At this stage of the design development, it is anticipated that demolition of 41 existing residential properties, 20 commercial/ business properties (including farm outbuildings) and 11 other structures would be required to construct the permanent features in the Appleby Parva to Ashby-de-la-Zouch 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 Appleby Parva and Ashby-de-la-Zouch area. The construction arrangements described in this section provide the basis for the assessment presented in this working draft ES.

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

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

2.3.4 During the construction phase, public roads and PRoW routes would remain open for public use wherever reasonably practicable. Where such routes would cross the Proposed Scheme and require diversion, the alternative road or PRoW crossing the

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

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

Code of Construction Practice

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

2.3.7 In addition, HS2 Ltd has produced a Community Engagement Framework[14] 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

[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

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

Advance works

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

- further detailed site investigations and surveys for proposed construction compounds;
- further detailed environmental surveys;
- advance mitigation works including, where appropriate, contamination remediation, habitat creation and translocation, landscape planting and built heritage survey and investigation;
- advance site access works;

- site establishment with temporary fence construction; along with soil stripping and vegetation removal; and
- utility diversions and new utility connections for facilities associated with the Proposed Scheme.

Engineering works

Introduction

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

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

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

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

General overview of construction compounds

2.3.16 Main compounds would be used for core project management staff (i.e. engineering, planning and construction delivery) and commercial and administrative staff. These teams would directly manage some works and coordinate the works at the satellite compounds. In general, a main compound would include:

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

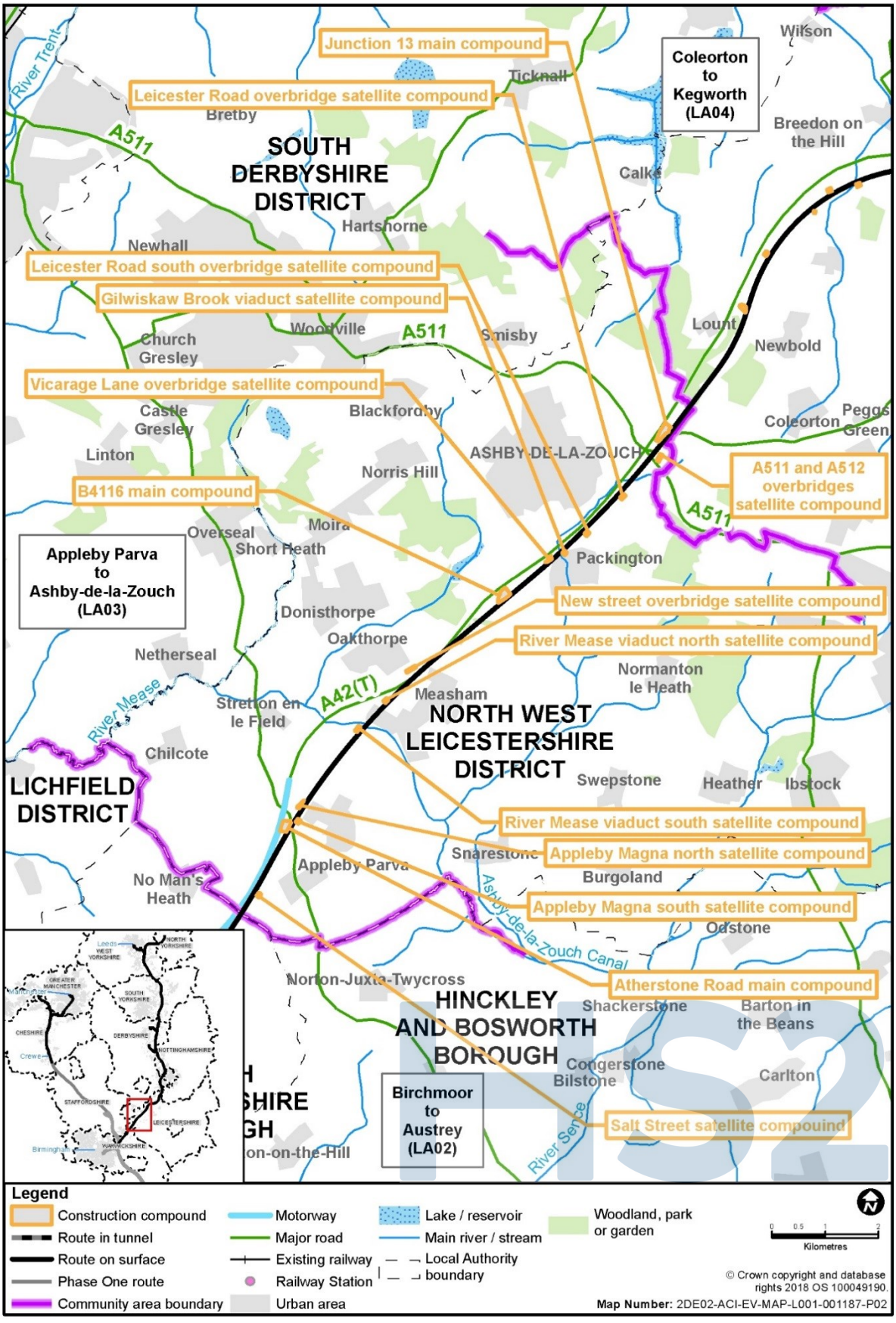
2.3.17 Satellite compounds would be used as the base to manage specific works along a section of the route. Depending on the nature and extent of the works to be managed, these satellite compounds could include office accommodation for staff, local storage for plant and materials, car parking for staff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

2.3.18 Three main civil engineering compounds would be located in the Appleby Parva to Ashby-de-la-Zouch area. These would manage 11 civil engineering satellite compounds in the Appleby Parva to Ashby-de-la-Zouch area.

2.3.19 On completion of the civil engineering works, two of these civil engineering satellite compounds would remain and continue to be used as railway installation satellite compounds. The Junction 13 main compound would also remain and would be used to manage these railway installation satellite compounds.

2.3.20 The location of construction compounds in the Appleby Parva to Ashby-de-la-Zouch area is shown on Figure 5. Map Series CT-05 (in the Volume 2: LA03 Map Book) show in detail the locations of the construction compounds described below.

Figure 5: Location of construction compounds in the Appleby Parva to Ashby-de-la-Zouch area



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

2.3.22 In the Appleby Parva to Ashby-de-la-Zouch area there would be no worker accommodation for the construction workforce.

2.3.23 Soil stripped as part of the works, prior to it being used when the land is reinstated, would be stored for the duration of construction. The location of topsoil 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, in the Volume 2: LA03 Map Book, CT-05-412b to CT-05-419a.

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 site 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 Appleby Parva to Ashby-de-la-Zouch area are described in the subsequent sections of this report.

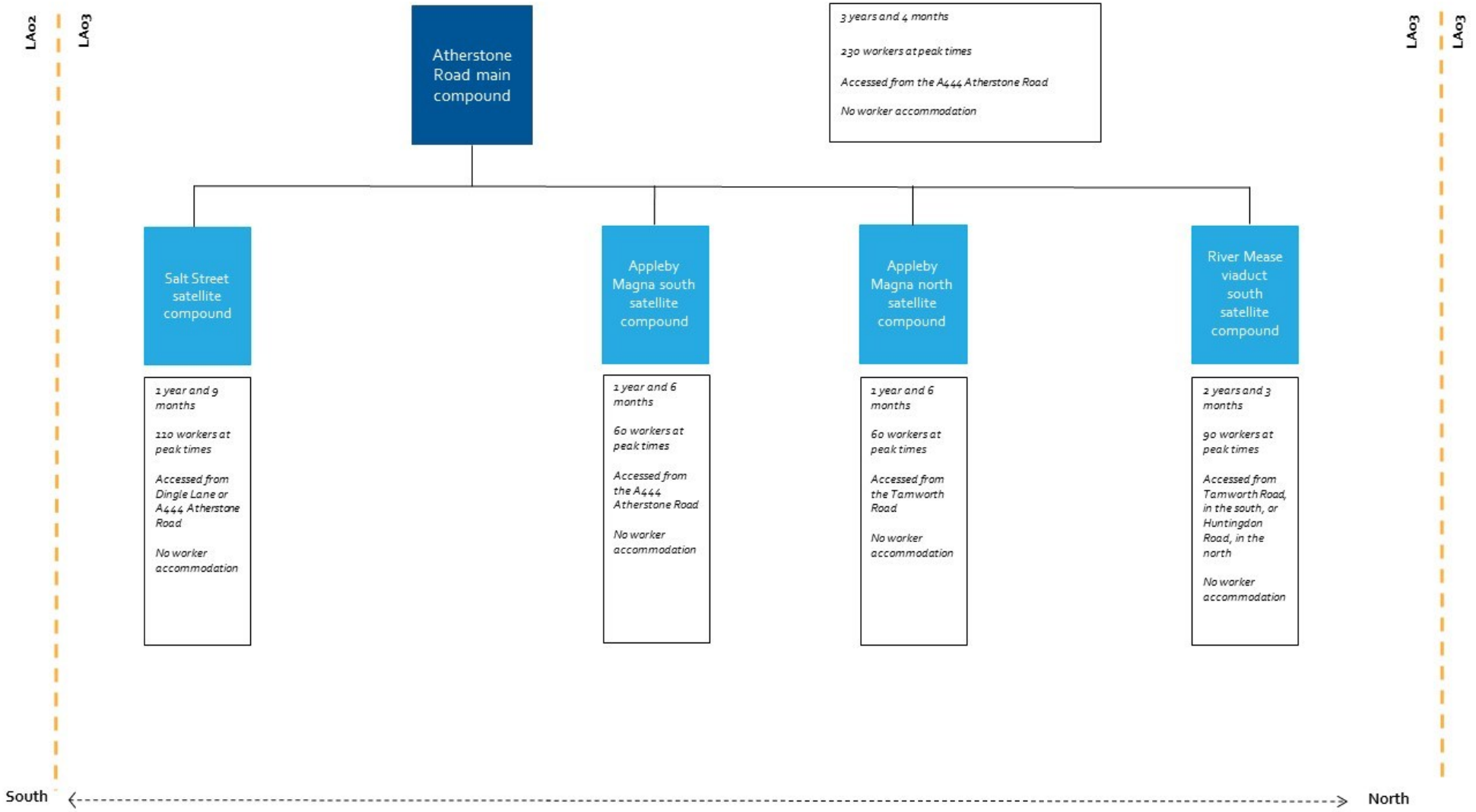
2.3.27 It may be necessary to undertake minor works including a number of minor highways and junction improvements along public roads that would be used as construction traffic routes but are at a distance from the route of Proposed Scheme. These minor works will be reported in the formal ES.

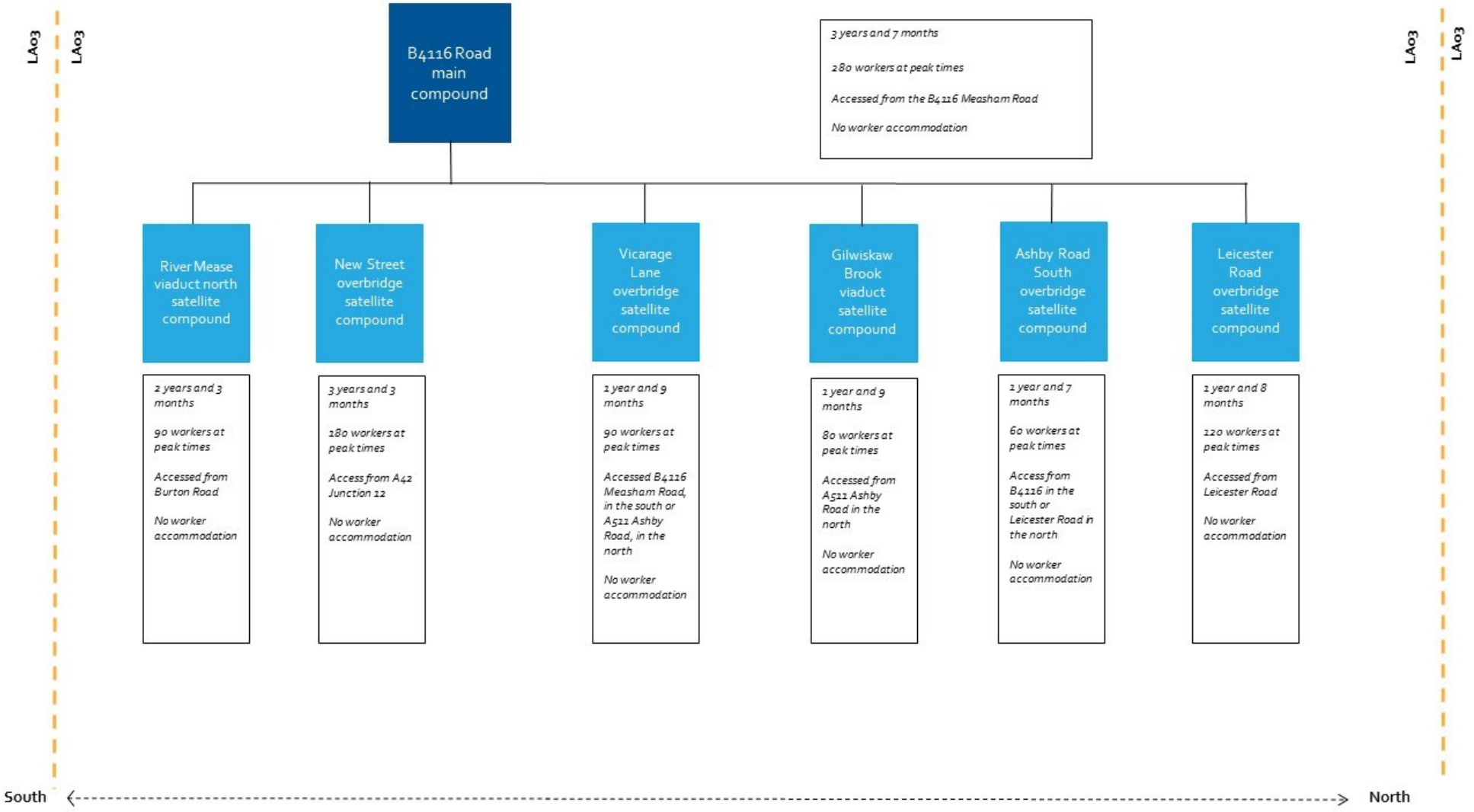
2.3.28 Areas of land are also required for the storage, loading and unloading of bulk earthworks materials that are moved to and from the site on public roads. These areas would allow transfer of material between road vehicles and site vehicles during construction to balance traffic movements on the road network. These areas are referred to as transfer nodes and are shown on Map CT-05-413 to CT-05-419a in the Volume 2: LA03 Map Book.

Construction compounds

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

Figure 6: Construction compounds for civil engineering works




LA03
LA03
B4116 Road main compound
3 years and 7 months
280 workers at peak times
Accessed from the B4116 Measham Road
No worker accommodation
LA03
LA03
River Mease viaduct north satellite compound
2 years and 3 months
90 workers at peak times
Accessed from Burton Road
No worker accommodation
New Street overbridge satellite compound
3 years and 3 months
180 workers at peak times
Access from A42 Junction 12
No worker accommodation
Vicarage Lane overbridge satellite compound
1 year and 9 months
90 workers at peak times
Accessed B4116 Measham Road, in the south or A511 Ashby Road, in the north
No worker accommodation
Gilwiskaw Brook viaduct satellite compound
1 year and 9 months
80 workers at peak times
Accessed from A511 Ashby Road in the north
No worker accommodation
Ashby Road South overbridge satellite compound
1 year and 7 months
60 workers at peak times
Access from B4116 in the south or Leicester Road in the north
No worker accommodation
Leicester Road overbridge satellite compound
1 year and 8 months
120 workers at peak times
Accessed from Leicester Road
No worker accommodation
South
North

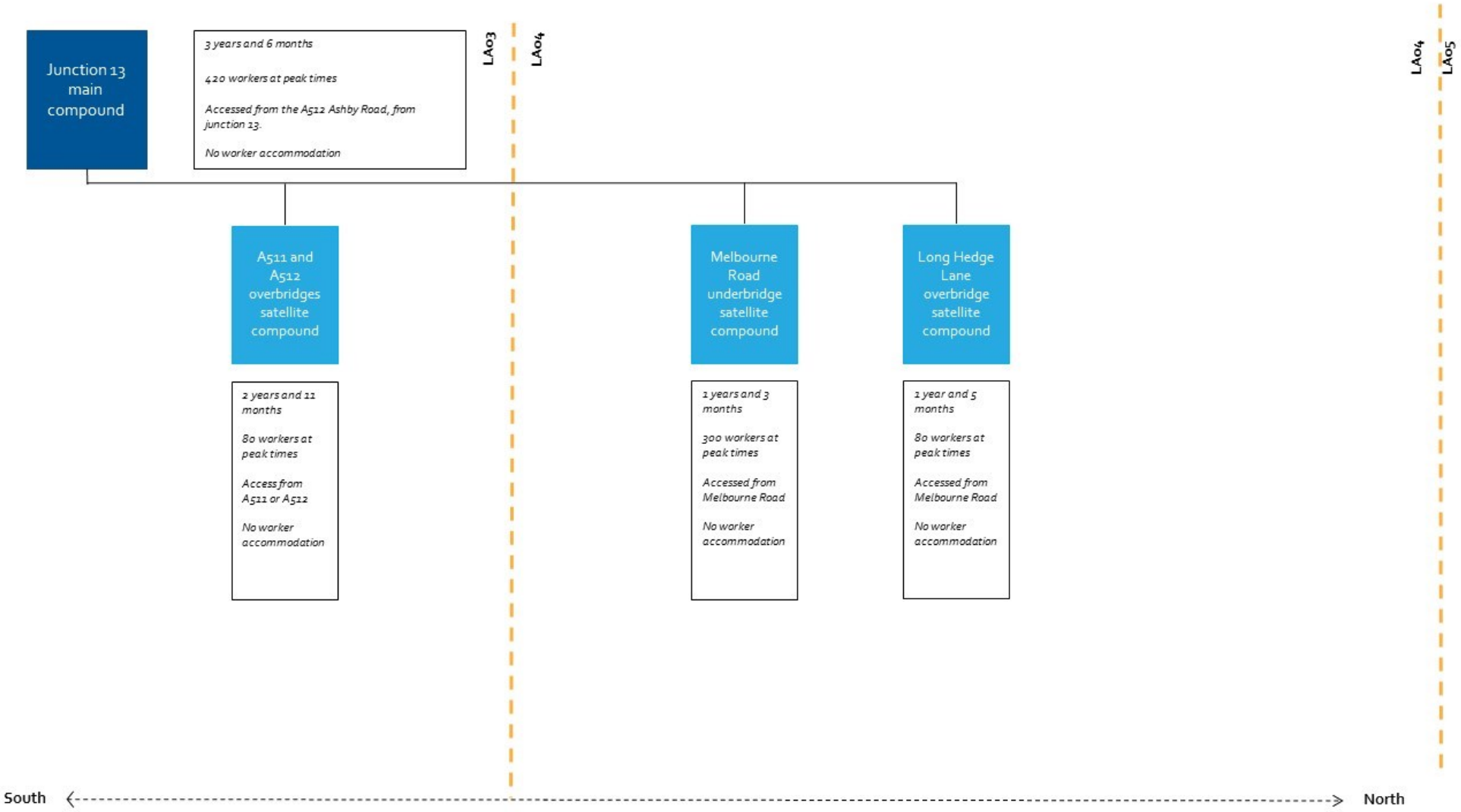
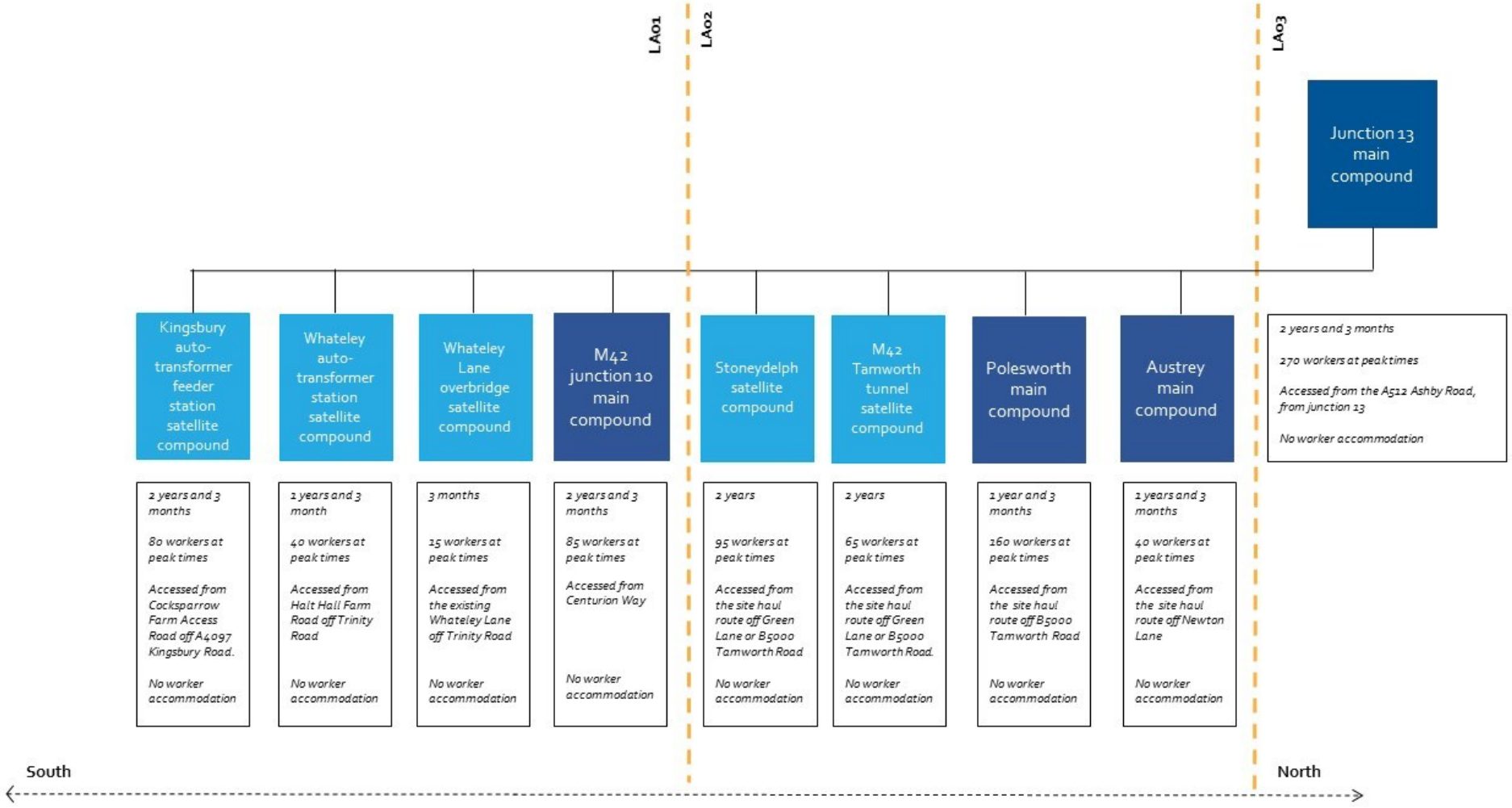
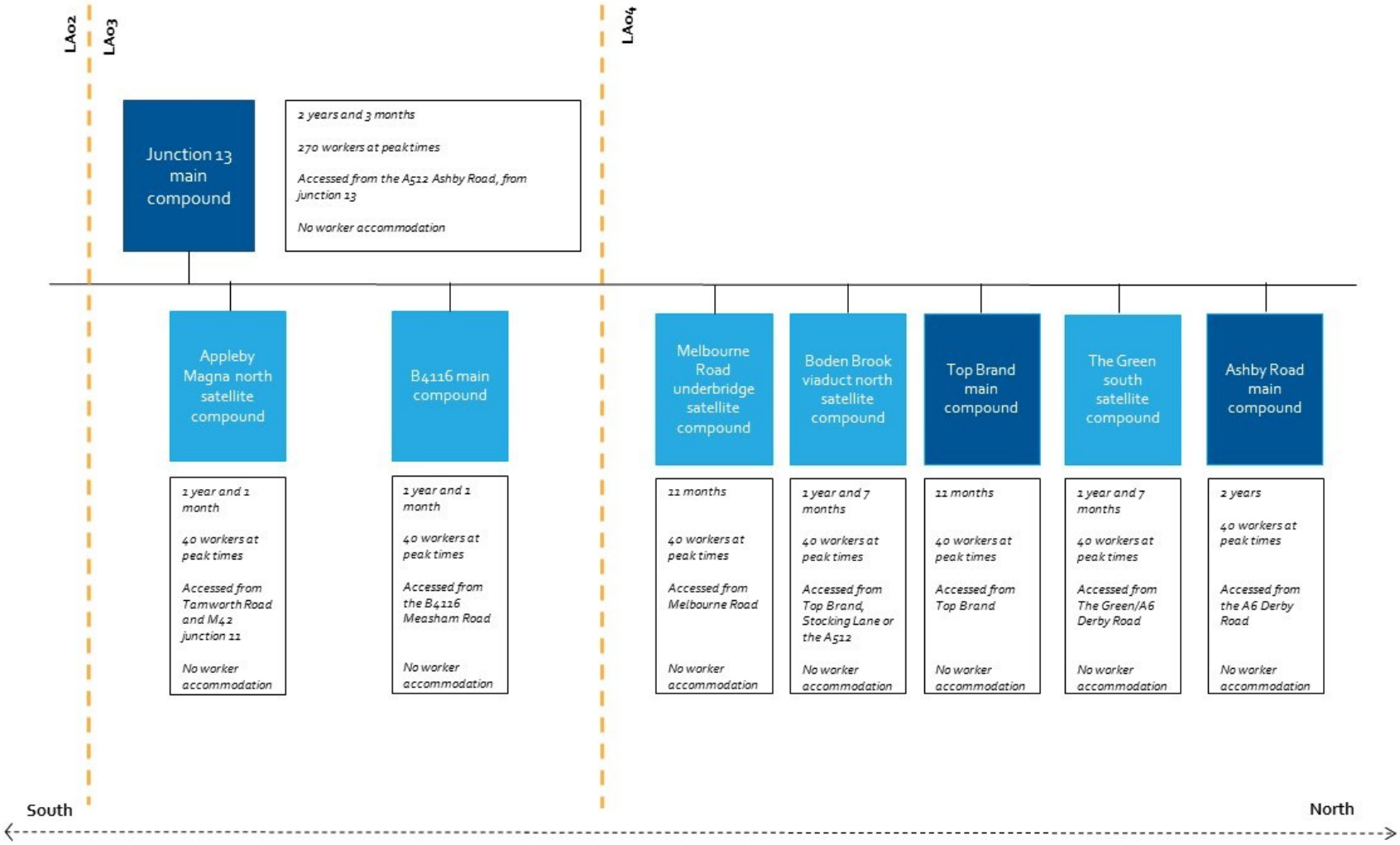
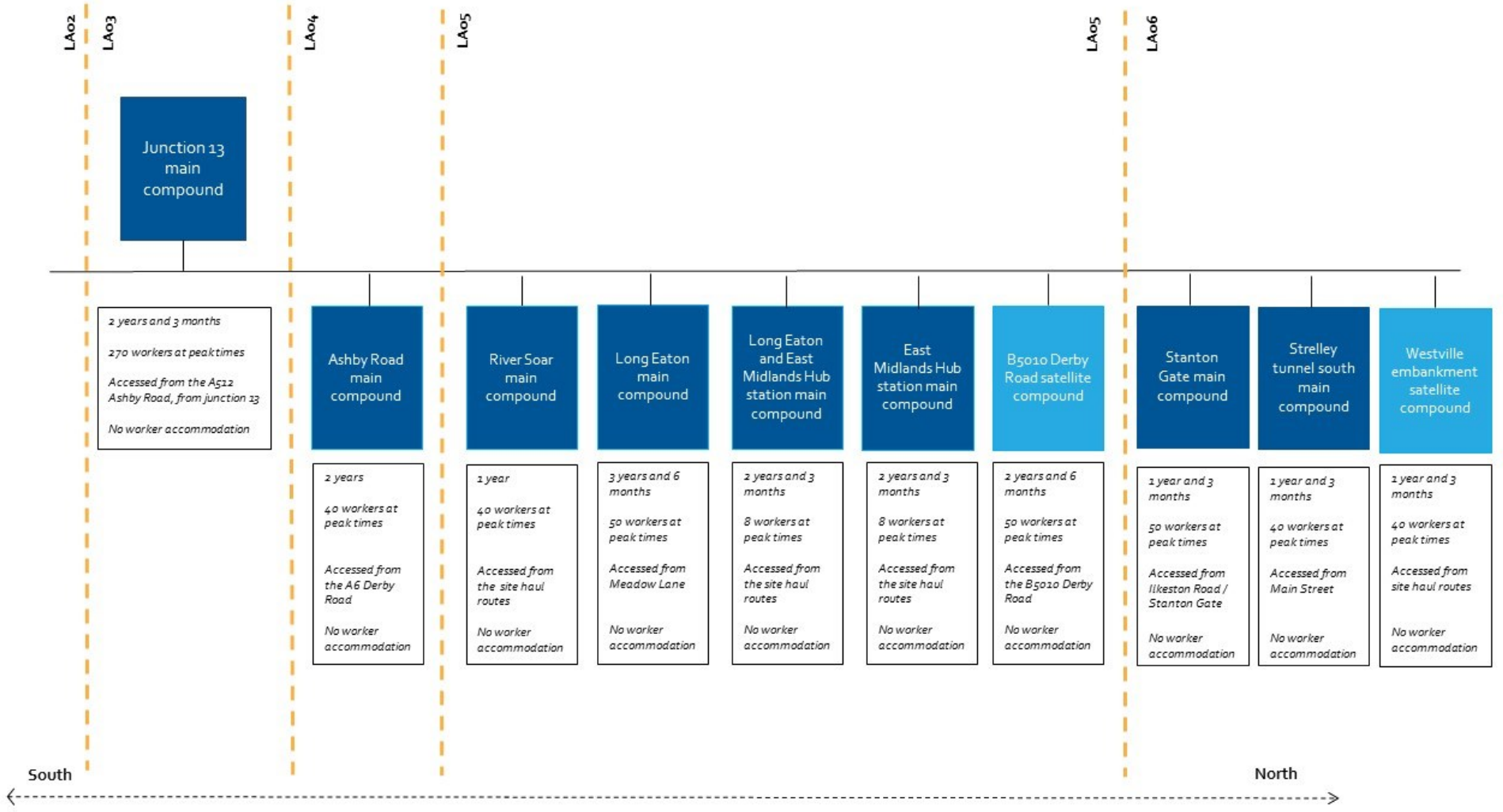

Junction 13 main compound
3 years and 6 months
420 workers at peak times
Accessed from the A512 Ashby Road, from junction 13.
No worker accommodation
LA03
LA04
LA04
LA05
A511 and A512 overbridges satellite compound
2 years and 11 months
80 workers at peak times
Access from A511 or A512
No worker accommodation
Melbourne Road underbridge satellite compound
1 years and 3 months
300 workers at peak times
Accessed from Melbourne Road
No worker accommodation
Long Hedge Lane overbridge satellite compound
1 year and 5 months
80 workers at peak times
Accessed from Melbourne Road
No worker accommodation
South
North

Figure 7: Construction compounds for railway systems works




LA02
LA03
LA04
Junction 13 main compound
2 years and 3 months
270 workers at peak times
Accessed from the A512 Ashby Road, from junction 13
No worker accommodation
Appleby Magna north satellite compound
1 year and 1 month
40 workers at peak times
Accessed from Tamworth Road and M42 junction 11
No worker accommodation
B4116 main compound
1 year and 1 month
40 workers at peak times
Accessed from the B4116 Measham Road
No worker accommodation
Melbourne Road underbridge satellite compound
11 months
40 workers at peak times
Accessed from Melbourne Road
No worker accommodation
Boden Brook viaduct north satellite compound
1 year and 7 months
40 workers at peak times
Accessed from Top Brand, Stocking Lane or the A512
No worker accommodation
Top Brand main compound
11 months
40 workers at peak times
Accessed from Top Brand
No worker accommodation
The Green south satellite compound
1 year and 7 months
40 workers at peak times
Accessed from The Green/A6 Derby Road
No worker accommodation
Ashby Road main compound
2 years
40 workers at peak times
Accessed from the A6 Derby Road
No worker accommodation
South
North


LA02
LA03
LA04
LA05
LA05
LA06
Junction 13 main compound
2 years and 3 months
270 workers at peak times
Accessed from the A512 Ashby Road, from junction 13
No worker accommodation
Ashby Road main compound
2 years
40 workers at peak times
Accessed from the A6 Derby Road
No worker accommodation
River Soar main compound
1 year
40 workers at peak times
Accessed from the site haul routes
No worker accommodation
Long Eaton main compound
3 years and 6 months
50 workers at peak times
Accessed from Meadow Lane
No worker accommodation
Long Eaton and East Midlands Hub station main compound
2 years and 3 months
8 workers at peak times
Accessed from the site haul routes
No worker accommodation
East Midlands Hub station main compound
2 years and 3 months
8 workers at peak times
Accessed from the site haul routes
No worker accommodation
B5010 Derby Road satellite compound
2 years and 6 months
50 workers at peak times
Accessed from the B5010 Derby Road
No worker accommodation
Stanton Gate main compound
1 year and 3 months
50 workers at peak times
Accessed from Ilkeston Road / Stanton Gate
No worker accommodation
Strelley tunnel south main compound
1 year and 3 months
40 workers at peak times
Accessed from Main Street
No worker accommodation
Westville embankment satellite compound
1 year and 3 months
40 workers at peak times
Accessed from site haul routes
No worker accommodation
South
North

Salt Street satellite compound

2.3.30 This compound (see Map CT-05-412b, D6 to D7) would be used to manage civil engineering works in the Appleby Parva to Ashby-de-la-Zouch and Birchmoor to Austrey areas, as illustrated in Figure 6. No demolitions would be required as a result of the works to be managed from this compound.

2.3.31 The compound would be used to manage the construction of the Salt Street overbridge, which would take one year and one month to complete.

2.3.32 The works to be managed from this compound would require the permanent diversion of Leicestershire Bridleway Q19/3 on the western side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period of one month.

2.3.33 The compound would be used to manage the construction of the Appleby Parva culvert, which would take three months to complete.

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

Atherstone Road main compound

2.3.35 This compound (see Map CT-05-413) would be used to manage civil engineering works and provide main compound support to four satellite compounds in the Appleby Parva to Ashby-de-la-Zouch area, as illustrated in Figure 6 for the civil engineering works.

2.3.36 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 Atherstone Road main compound

Description	Location	Feature resulting in the demolition
Residential		
Residential property and outbuildings	The Old Rectory, Rectory Lane, Appleby Magna	Appleby Magna cutting

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

- Salt Street cutting, which would take one year and six months to complete;
- Appleby Parva embankment, which would take two years and three months to complete;
- Appleby Parva cutting, which would take two years and one month to complete;
- Appleby Magna embankment No.1, which would take two years to complete;
- Appleby Magna cutting, which would take three years and four months to complete; and
- Appleby Magna embankment No.2, which would take three years and four months to complete.

2.3.38 The works to be managed from this compound would require the permanent diversion of Leicestershire Footpath Q3/2 on the eastern side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period one year and six months.

2.3.39 Transfer nodes are areas for the storage and loading and unloading of bulk earthworks material, which would be moved to and from the site on public highways.

2.3.40 There would be a transfer node associated with Atherstone main construction compound within the Appleby Parva to Ashby-de-la-Zouch area occupying land between the M42 corridor and the Proposed Scheme, south of the M42 junction 11. The transfer node would stretch from 1km to the north-east of Dingle Lane to 350m south of Appleby Park Hotel (Volume 2: LA03 Map Book, maps CT-05-412b, I4 to J5 and CT-05-413, A4 to B5).

2.3.41 The transfer node would be operational from 2025 for three years and four months. Access to the transfer node would be from A444 Atherstone Road via the site haul route.

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

Appleby Magna south satellite compound

2.3.43 This compound (see Map CT-05-413, C5 to D6) would be used to manage civil engineering works in the Appleby Parva to Ashby-de-la-Zouch area, as illustrated in Figure 6.

2.3.44 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 Appleby Magna south satellite compound

Description	Location	Feature resulting in the demolition
Other		
Shed	Appleby Magna Service Area, Atherstone Road, Appleby Magna	A444 Atherstone Road realignment

2.3.45 The compound would be used to manage the construction of the A444 Atherstone Road overbridge, which would take one year and six months to complete.

2.3.46 The works to be managed from this compound would require the permanent realignment of the A444 Atherstone Road on both sides of the Proposed Scheme, and 60m north-east of its existing alignment, which would take one year and six months to complete and would be constructed offline[15]. On completion of construction, temporary lane restrictions and traffic management measures would be implemented for three months to enable connection between the realigned road and the existing road.

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

2.3.47 The works to be managed from this compound would require the permanent diversion of Leicestershire Footpath Q12/1 on the western side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period one year and five months.

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

Appleby Magna north satellite compound

2.3.49 This compound (see Map CT-05-413, D4 to E5) would be used to manage civil engineering works in the Appleby Parva to Ashby-de-la-Zouch area, as illustrated in Figure 6, for a period of one year and nine months. On completion of the civil engineering works, the compound would remain and manage railway systems installation works for a period of one year and three months.

2.3.50 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 Appleby Magna north satellite compound

Description	Location	Feature resulting in the demolition
Residential		
Three residential properties	Rectory Lane, Appleby Magna	Rectory Lane diversion

2.3.51 The compound would be used to manage the construction of the Tamworth Road overbridge, which would take one year and six months to complete.

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

- temporary closure of 550m of Rectory Lane during construction for a period of one year and six months, with diversions along the Rectory Lane from Appleby Magna. During this time, the permanent diversion of Rectory Lane would be constructed, which would take three months to complete. Following the construction period, Rectory Lane would be permanently diverted by 120m to the north of its existing alignment; and
- permanent realignment of Tamworth Road to both sides of the Proposed Scheme, and 100m north-east of its existing alignment, which would take one year and six months to complete and would be constructed offline. On completion of construction, temporary lane restrictions and traffic management measures would be implemented for three months to enable connection between the realigned road and the existing road.

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

- permanent diversion of Leicestershire Footpath Q13/1 on the western side of the route of the Proposed Scheme; and

- permanent diversion of Leicestershire Footpath Q3/1 on the western side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period one year and six months.

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

2.3.55 This compound would be used to manage railway systems works in the Appleby Parva to Ashby-de-la-Zouch area after the civils construction phase, as illustrated in Figure 7.

2.3.56 Key railway systems works to be managed from this compound would include construction and installation of the Appleby Magna auto-transformer station, located 200m west of Manor House Farm. The duration of the construction the Appleby Magna auto-transformer station foundations and building will be reported in the formal ES. The installation of the Appleby Magna auto-transformer station railway systems equipment would take one year and one month to complete. Construction works for the Appleby Magna auto-transformer station would be accessed via Tamworth Road.

River Mease viaduct south satellite compound

2.3.57 This compound (see Map CT-05-414, E5 to F5) would be used to manage civil engineering works in the Appleby Parva to Ashby-de-la-Zouch area, as illustrated in Figure 6.

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

Table 4: Demolitions required as a result of the works to be managed from the River Mease viaduct south and River Mease north satellite compound

Description	Location	Feature resulting in the demolition
Commercial		
Fourteen industrial units at Huntington Court	Huntingdon Court, Huntingdon Way, Measham	River Mease viaduct
Four industrial units and outbuildings at Westminster Industrial Estate	Westminster Industrial Estate, Measham	River Mease viaduct
Other		
Electricity sub-station	Burton Road, Measham	River Mease viaduct

2.3.59 The compound would be used to manage the construction of the River Mease viaduct, which would take two years and three months to complete.

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

River Mease viaduct north satellite compound

2.3.61 This compound (see Map CT-05-414, I5 to I6) would be used to manage civil engineering works in the Appleby Parva to Ashby-de-la-Zouch area, as illustrated in Figure 6.

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

2.3.63 The compound would be used to manage the construction of the following works to viaducts and underbridges:

- River Mease viaduct, which would take two years and three months to complete; and
- Ashby Canal Restoration underbridge, which would take one year and one month to complete.

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

New Street overbridge satellite compound

2.3.65 This compound (see Map CT-05-415, D4 to E5) would be used to manage civil engineering works in the Appleby Parva to Ashby-de-la-Zouch area, as illustrated in Figure 6.

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

Table 5: Demolitions required as a result of the works to be managed from the New Street overbridge satellite compound

Description	Location	Feature resulting in the demolition
Residential		
Residential property and outbuildings	Treetops Farm, Measham Road, Oakthorpe	New Street realignment
Other		
Telecommunications mast	Measham Road, Oakthorpe	A42 realignment
Stables	Measham Road, Oakthorpe	A42 realignment

2.3.67 The compound would be used to manage the construction of the New Street overbridge, which would take one year and five months to complete.

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

- permanent realignment of New Street to both sides of the Proposed Scheme, 20m north-east of its existing alignment, which would take one year and five months to complete and would be constructed offline. On completion of construction, temporary lane restrictions and traffic management measures would be implemented for four months to enable connection between the realigned road and the existing road; and
- permanent realignment of the A42 to the west of the Proposed Scheme, and 70m west of its existing alignment, which would take three years and three months to complete and would be constructed offline. On completion of construction, temporary lane restrictions and traffic management measures would be implemented for seven months to enable connection between the realigned road and the existing road.

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

B4116 main compound

2.3.70 This compound (see Map CT-05-416, G4 to I5) would be used to manage civil engineering works and provide main compound support to six satellite compounds in the Appleby Parva to Ashby-de-la-Zouch area, as illustrated in Figure 6, for a period of three year and six months. On completion of the civil engineering works, the compound would remain and manage railway systems installation works for a period of one year and three months.

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

Table 6: Demolitions required as a result of the works to be managed from the B4116 main compound

Description	Location	Feature resulting in the demolition
Residential		
27 residential properties and outbuildings on Amersham Way	Amersham Way, Measham	A42 Measham cutting
Seven residential properties and outbuildings on Park Farm	Willesley Wood Side, Willesley, Ashby-de-la-Zouch	Willesley Wood Side cutting
Residential property and outbuildings	Sweethill Cottage, Willesley Wood Side, Willesley, Ashby-de-la-Zouch,	Willesley Wood Side cutting
Residential property and outbuildings on Leicester Road	Leicester Road, New Packington, Ashby-de-la-Zouch	Ashby-de-la-Zouch cutting No.1
Commercial		
Commercial property	Leicester Road, Ashby-de-la-Zouch	Ashby-de-la-Zouch cutting No.1
Other		
Outbuilding	Vicarage Lane, Packington	Measham Road Packington cutting
Telecommunications mast	Leicester Road, New Packington, Ashby-de-la-Zouch	Ashby-de-la-Zouch cutting No.1
Electricity sub-station	Leicester to Burton-upon-Trent Line, New Packington, Ashby-de-la-Zouch	Ashby-de-la-Zouch cutting No.1
Outbuildings	Beech Farm House, Ashby Road, Ashby-de-la-Zouch, Leicestershire	Ashby-de-la-Zouch cutting No.1
Outbuildings	Mill Street, Packington	Ashby-de-la-Zouch cutting No.1

2.3.72 The compound would be used to manage the construction of the B4116 Measham Road overbridge, which would take one year and seven months to complete.

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

- Measham embankment No.1, which would take three years and one month to complete;
- A42 Measham cutting, which would take three years and six months to complete;
- Measham embankment No.2, which would take three years and one month to complete;

- Willesley Wood Side cutting, which would take three years to complete;
- Measham Road Packington embankment, which would take two years and four months to complete;
- Measham Road Packington cutting, which would take 11 months to complete;
- Ashby-de-la-Zouch embankment, which would take one year and two months to complete; and
- Ashby-de-la-Zouch cutting No.1, which would take two years and nine months to complete.

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

- temporary closure of 575m of Willesley Wood Side. The duration of the construction of the diverted Willesley Wood Side will be reported in the formal ES. Following the construction period, Willesley Wood Side would be permanently diverted by 260m north of its existing alignment; and
- temporary realignment of 150m of B4116 Measham Road during construction for a period of one year and seven months, with diversions along Willesley Wood Side diversion. During this time, the B4116 Measham Road overbridge would be constructed. Following the construction period, B4116 Measham Road would be permanently reinstated on its existing alignment.

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

- permanent diversion of Leicestershire Footpath P81/1 on the western side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period one year;
- temporary diversion of Leicestershire Footpath P85/6, with users diverted via alternative routes for a period one year. On completion of construction, Leicestershire Footpath P85/6 would be permanently reinstated to its existing alignment;
- closure of Leicestershire Footpath P75/5 where it crosses the route of the Proposed Scheme, users would be permanently diverted to the realigned Leicestershire Footpath P69/4 and Leicestershire Footpath P81/1;
- closure of Leicestershire Footpath P67/5 where it crosses the route of the Proposed Scheme, users would be permanently diverted to the realigned Leicestershire Footpath PQ69/4 and Leicestershire Footpath P81/1;
- permanent diversion of Leicestershire Footpath P75/6 on the eastern side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period three years;

- permanent realignment of Leicestershire Footpath P69/4 on the western side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period one year;
- permanent diversion of Leicestershire Footpath P1/1 on the western side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period one year and five months;
- closure of the Leicestershire Bridleway P8/1 where it would cross the Proposed Scheme. Users would be diverted from Leicestershire Bridleway along Willesley Woodside diversion; and
- permanent realignment of Leicestershire Footpath O68/4 on the western side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period one year and one month.

2.3.76 There would be a total of four transfer nodes managed from the B4116 main compound within the Appleby Parva to Ashby-de-la-Zouch area, they are:

- a transfer node on land west of the realigned A42 and north of New Street. The transfer node would stretch adjacent north of New Street, from Oakthorpe to adjacent west to the route for the Proposed Scheme (Volume 2: LA03 Map Book, Map CT-05-415, D3 to E4) and would be operational from 2025 for three years and seven months. Access to the transfer node would be from the site haul route;
- a transfer node on land between the A42 corridor and the Proposed Scheme. The transfer node would stretch from Sweethill Cottage to the B4116 Measham Road (Volume 2: LA03 Map Book, Map CT-05-416, E4 to G5) and would be operational from 2025 for three years and seven months. Access to the transfer node would be from the B4116 Measham Road and the site haul route;
- a transfer node on land between the A42 corridor and the Proposed Scheme. The transfer node would stretch from 45m north-east of the B4116 Measham Road to 20m south-west of Vicarage Lane (Volume 2: LA03 Map Book, maps CT-05-416, I4 to J5 and CT-05-417, A4 to D5) and would be operational from 2025 for three years and seven months. Access to the transfer node would be from the B4116 Measham Road and the site haul route; and
- a transfer node on land west of the Proposed Scheme, near New Packington. The transfer node would stretch from Leicester Road to the Leicester to Burton upon Tent line (Volume 2: LA03 Map Book, Map CT-05-418a, E8 to G10) and would be operational from 2025 for three years and seven months. Access to the site would be from Leicester Road and the site haul route.

2.3.77 The compound would be used to manage the construction of the Measham Road Packington culvert, which would take five months to complete.

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

2.3.79 This compound would be used to manage railway systems works in Appleby Parva to Ashby-de-la-Zouch area after the civils construction phase, as illustrated in Figure 7.

2.3.80 Key railway systems works to be managed from this compound would include construction and installation of the Packington mid-point auto-transformer station, located 400m east of the B4116 Measham road. The duration of the construction the Packington mid-point auto-transformer station foundations and building will be reported in the formal ES. The installation of the Packington mid-point auto-transformer station railway systems equipment would take one year and one month to complete. Construction works for the Packington mid-point auto-transformer station would be accessed from B4116 Measham road.

Vicarage Lane overbridge satellite compound

2.3.81 This compound (see Map CT-05-417, D5 to E5) would be used to manage civil engineering works in the Appleby Parva to Ashby-de-la-Zouch area, as illustrated in Figure 6.

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

2.3.83 The compound would be used to manage the construction of the following structures:

- Vicarage Lane overbridge, which would take one year and two months to complete; and
- Gilwiskaw Brook viaduct, which would take one year and nine months to complete.

2.3.84 The works to be managed from this compound would require the permanent realignment of Vicarage Lane on both sides of the Proposed Scheme, 170m south of its existing alignment, which would take one year and two months to complete and would be constructed offline. On completion of construction, temporary lane restrictions and traffic management measures would be implemented for two months to enable connection between the realigned road and the existing road.

2.3.85 The works to be managed from this compound would require the permanent realignment of Leicestershire Bridleway O70/1 on the both sides of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period one year and one month.

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

Gilwiskaw Brook viaduct satellite compound

2.3.87 This compound (see Map CT-05-417, F6) would be used to manage civil engineering works in the Appleby Parva to Ashby-de-la-Zouch area, as illustrated in Figure 6.

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

2.3.89 The compound would be used to manage the construction of the Gilwiskaw Brook viaduct, which would take one year and nine months to complete.

2.3.90 The compound would be used to manage the realignment of Gilwiskaw Brook under the Gilwiskaw Brook viaduct. The duration of the construction of the realignment of Gilwiskaw Brook will be reported in the formal ES.

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

- permanent diversion of Leicestershire Footpath O71/2 on the western side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period one year and nine months;
- permanent diversion of Leicestershire Footpath O74/2 on the western side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period one year and nine months;
- closure of the Leicestershire Footpath O72/1 where it would cross the Proposed Scheme. Users would be diverted to the realigned Leicestershire Bridleway P20/1; and
- permanent realignment of Leicestershire Bridleway P20/1 on the western side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period two year and six months.

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

Ashby Road south overbridge satellite compound

2.3.93 This compound (see Map CT-05-417, I6) would be used to manage civil engineering works in the Appleby Parva to Ashby-de-la-Zouch area, as illustrated in Figure 6.

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

2.3.95 The compound would manage the construction of the Ashby Road south overbridge, which would take one year and seven months to complete.

2.3.96 The works to be managed from this compound would require the temporary closure of 150m Ashby Road south during construction for a period of one year and seven months, with diversions along Leicester Road and B4116 Measham Road. During this time, the Ashby Road south overbridge would be constructed. Following the construction period, Ashby Road south would be permanently reinstated by 150m on its existing horizontal alignment.

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

Leicester Road overbridge satellite compound

2.3.98 This compound (see Map CT-05-418a, L6 to F7) would be used to manage civil engineering works in the Appleby Parva to Ashby-de-la-Zouch area, as illustrated in Figure 6.

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

2.3.100 The compound would be used to manage construction of the following structures:

- Leicester Road overbridge, which would take one year and five months to complete; and
- Leicester to Burton upon Trent Line Railway overbridge, which would take one year and eight months to complete.

2.3.101 The works to be managed from this compound would require the temporary closure of 150m Leicester Road during construction for a period of one year and five months, with diversions along Ashby Road south. During this time, the Leicester Road overbridge would be constructed. Following the construction period, Leicester Road would be permanently reinstated on its existing vertical and horizontal alignment.

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

Junction 13 main compound

2.3.103 This compound (see Map CT-05-419a, C5 to E5) would be used to manage civil engineering works and provide main compound support to one satellite compound in Appleby Parva to Ashby-de-la-Zouch area and to two satellite compounds in the Coleorton to Kegworth area (LA04), as illustrated in Figure 6 for the civil engineering works. Details of the works to be managed from this compound in the Coleorton to Kegworth area are provided in Volume 2: Community area report LA04, Coleorton to Kegworth area.

2.3.104 On completion of the civil engineering works, the compound would remain and manage railway system installation works and railway system compounds, as illustrated in Figure 7, for a period of two years and one month. This compound would be used to manage railway system works in the Appleby Parva to Ashby-de-la-Zouch area and also in the Lea Marston to Tamworth, Birchmoor to Austrey, Coleorton to Kegworth and Ratcliffe-on-Soar to Long Eaton areas.

2.3.105 The works to be managed from this compound would require demolition of the following buildings and structures, as described in Table 7.

Table 7: Demolitions required as a result of the works to be managed from the Junction 13 main compound

Description	Location	Feature resulting in the demolition
Commercial		
Sandwich shop	Ashby Road, Ashby-de-la-Zouch	Ashby-de-la-Zouch cutting No.2
Other		
Telecommunications mast	Ashby Road, Ashby-de-la-Zouch	Ashby-de-la-Zouch cutting No.2
Wind turbine	Ashby Road, Ashby-de-la-Zouch	Ashby-de-la-Zouch cutting No.2

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

- New Packington embankment, which would take one year to complete; and
- Ashby-de-la-Zouch cutting No.2, which would take three years and six months to complete.

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

- permanent realignment of Leicestershire Footpath M60/3 on the western side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period two years and eleven months; and
- permanent realignment of Leicestershire Bridleway M30/1 on the western side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period two years and eleven months.

2.3.108 The compound would be used to manage the construction of New Packington culvert for the realignment of the tributary 2 to Coleorton Brook under the route of the Proposed Scheme, which would take five months to complete.

2.3.109 There would be a transfer node associated with Junction 13 main construction compound within the Appleby Parva to Ashby-de-la-Zouch area occupying land between the M42 corridor and the Proposed Scheme, north of junction 13. The transfer node would stretch from 500m to the north of junction 13 to 550m north of junction 13 (Volume 2: LA03 Map Book, Map CT-05-413, A4 to B5).

2.3.110 The transfer node would be operational from 2025 for three years and six months. Access to the transfer node would be from A512 and using the site haul route.

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

A511 and A512 overbridges satellite compound

2.3.112 This compound (see Map CT-05-419a, B7 to C7) would be used to manage civil engineering works in the Appleby Parva to and Ashby-de-la-Zouch area, as illustrated in Figure 6.

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

2.3.114 The compound would be used to manage the construction of the following structures:

- A511 Ashby Road overbridge, which would take one year and five months to complete;
- A512 Ashby Road overbridge, which would take one year and seven months to complete; and
- SRFT underbridge, which would take one year and seven months to complete.

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

- temporary closure of 100m of A511 Ashby Road during construction for a period of one year and five months. During this time, the A511 Ashby Road overbridge would be constructed. Following the construction period, the A511 Ashby Road would be permanently reinstated by 100m on its existing vertical and horizontal alignment;

- permanent realignment of A512 Ashby Road 230m south of its existing alignment, which would take one year and seven months to complete and would be constructed offline. On completion of construction, temporary lane restrictions and traffic management measures would be implemented for four months to enable connection between the realigned road and the existing road; and
- permanent access to the SRFT development site, to the east of the Proposed Scheme, which would take one year and seven months to complete.

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

Construction waste and material resources

2.3.117 Excavated material generated across the Proposed Scheme would be reused as engineering fill material or in the environmental mitigation earthworks of the Proposed Scheme, where suitable and reasonably practicable, either with or without treatment.

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

2.3.119 Local excess or shortfall of excavated material within the Appleby Parva to Ashby-de-la-Zouch area would be managed through the mitigation earthworks design approach adopted for the Proposed Scheme, with the aim of contributing to an overall balance of excavated material on a route-wide basis. The overall balance of excavated material will be presented in Volume 3: Route-wide effects of the formal ES.

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

Commissioning of the railway

2.3.121 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

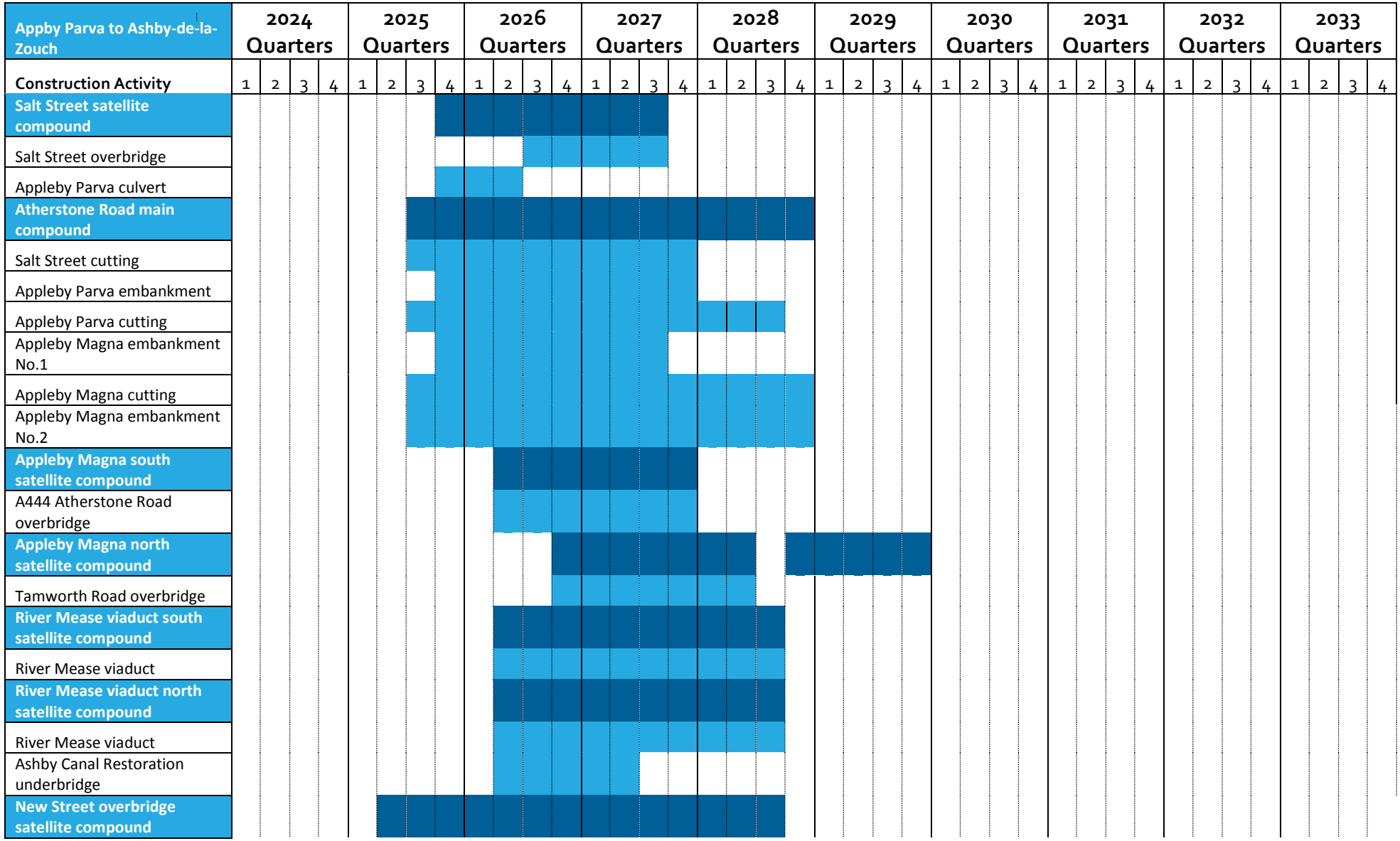
2.3.122 A construction programme illustrating indicative periods for each of the core construction activities described above is provided in Figure 8. Construction durations referred to in the following sections of this report are based on this indicative programme.

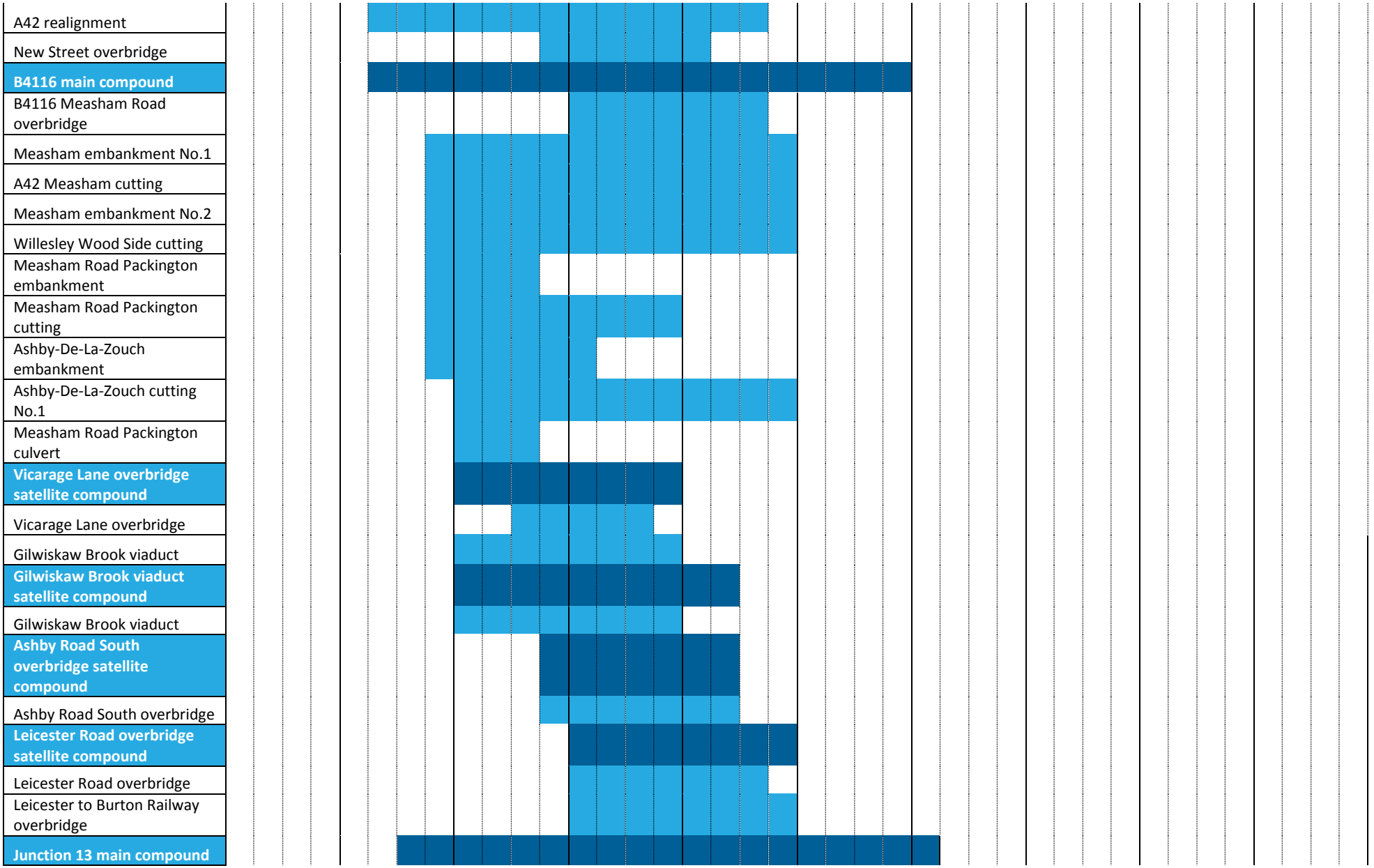
Monitoring during construction

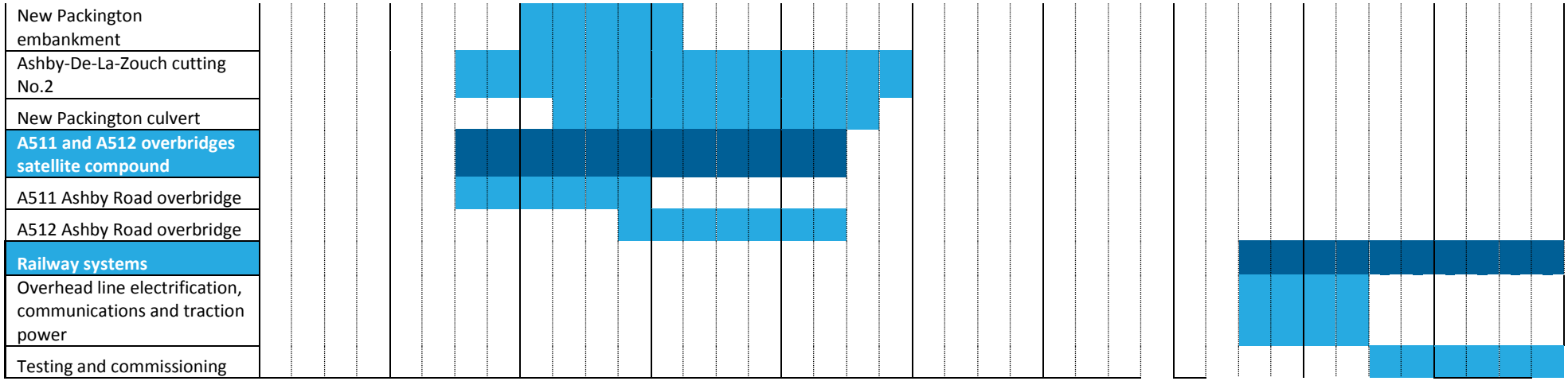
2.3.123 The appointed contractor would be required to undertake the necessary monitoring for each environmental topic to comply with the requirements of the CoCP, the relevant LEMP and any additional consent requirements. Any actions that may be necessary for compliance would be reported to the nominated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

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

Figure 8: Indicative construction programme between 2023 and 2033




A42 realignment
New Street overbridge
B4116 main compound
B4116 Measham Road overbridge
Measham embankment No.1
A42 Measham cutting
Measham embankment No.2
Willesley Wood Side cutting
Measham Road Packington embankment
Measham Road Packington cutting
Ashby-De-La-Zouch embankment
Ashby-De-La-Zouch cutting No.1
Measham Road Packington culvert
Vicarage Lane overbridge satellite compound
Vicarage Lane overbridge
Gilwiskaw Brook viaduct
Gilwiskaw Brook viaduct satellite compound
Gilwiskaw Brook viaduct
Ashby Road South overbridge satellite compound
Ashby Road South overbridge
Leicester Road overbridge satellite compound
Leicester Road overbridge
Leicester to Burton Railway overbridge
Junction 13 main compound


New Packington embankment
Ashby-De-La-Zouch cutting No.2
New Packington culvert
A511 and A512 overbridges satellite compound
A511 Ashby Road overbridge
A512 Ashby Road overbridge
Railway systems
Overhead line electrification, communications and traction power
Testing and commissioning

2.4 Operation of the Proposed Scheme

Introduction

2.4.1 This section describes the operational characteristics of the Proposed Scheme in the Appleby Parva to Ashby-de-la-Zouch 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 nine trains per hour each way passing through the Appleby Parva to Ashby-de-la-Zouch area. Services are expected to operate between 05:00 and midnight from Monday to Saturday and 08:00 and midnight on Sunday.

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

Maintenance

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

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

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

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

2.5.1 The strategic, route-wide and route corridor alternatives to the Proposed Scheme and local alternatives considered prior to July 2017 are presented in Volume 1, Introduction and methodology and in Supporting document: Alternatives report. The local alternatives considered for the Proposed Scheme within the Appleby Parva to Ashby-de-la-Zouch area since the route announcement in July 2017 are described in this section.

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

2.5.3 As part of the design development process since July 2017, consideration has been given to the impact of the Proposed Scheme on local residents of the Appleby Parva to Ashby-de-la-Zouch area and environmental receptors. This includes agricultural holdings, the River Mease Special Area of Conservation (SAC)/Site of Special Scientific Interest (SSSI), Parker's Wood and Fiveways Wood, which are part of the National Forest, the Old Rectory and Park Farm (both of which are Grade II listed buildings), and Gilwiskaw Brook.

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

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 8.

Table 8: Mechanisms and timeline of stakeholder engagement since route announcement

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

Engagement and consultation activity and mechanisms	Date
Phase 2b information events to provide update on design development	June-July 2018
Phase 2b consultation on the working draft ES and working draft EQIA	October – December 2018

Draft EIA SMR consultation

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

Consultation on the working draft ES and ongoing engagement

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

3.2.4 These consultations and wider feedback from ongoing stakeholder engagement will continue to be considered as part of the ongoing design of the Proposed Scheme and the assessment and identification of mitigation opportunities for the Appleby Parva to Ashby-de-la-Zouch 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 Appleby Parva to Ashby-de-la-Zouch 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;
- refining the location of balancing ponds and environmental mitigation to minimise the loss of agricultural land;
- provision of access to severed agricultural land, including access under viaducts and the provision of farm access tracks;
- retention or realignment of public rights of way (PRoW);
- temporary or permanent changes to road access including access for businesses, development sites and provision of farm access tracks;

- traffic impacts on local roads during construction;
- impacts on access to local community educational/care/sporting/leisure/ cultural facilities including Packington residents access to schools in Ashby-de-la-Zouch;
- impacts to local businesses;
- impacts leading to traffic impacts on the A42 and associated junctions;
- maintaining the future viability of developments such as the Measham Wharf housing development, and the associated Ashby Canal Restoration project and the strategic rail freight terminal (SRFT); and
- reducing impact and the potential loss of habitat at the River Mease (Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI)).

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 Appleby Parva to Ashby-de-la-Zouch area include a range of local interest groups, local facility and service providers, places of worship, schools and educational establishments, cultural, leisure and sports stakeholders.

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

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

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

3.4.5 Table 9 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 9: Engagement to date with community stakeholders.

Stakeholder	Area of focus
Appleby Parva to Ashby-de-la-Zouch Area Councillors	Meeting to discuss the design, project progress and discuss concerns raised and opportunities to assist design development to remove and reduce impacts to the local area and residents
Packington Residents Group	Engagement to discuss the Proposed Scheme and understand the local conditions to inform emerging design of the Proposed Scheme, including height of the Proposed Scheme, use of a viaduct over the Gilwiskaw Brook, use of a deep cutting, construction traffic and access along Ashby Road
Ashby Canal Trust	Discussion on impacts of the Proposed Scheme on the viability of the Ashby Canal Restoration project and mitigation of potential impacts
Ashby Canal Association	Discussion on impacts of the Proposed Scheme on the viability of the Ashby Canal Restoration project and mitigation of potential impacts
Leicestershire Local Access Forum	Meeting to discuss impacts of the Proposed Scheme on PRoW, bridleways and national cycle network (NCN) routes in Leicestershire
Packington Nook Residents Association	Meeting to discuss impacts of the Proposed Scheme on the settlements of Austrey, Appleby Magna, Measham and Packington and mitigation of potential impacts
Leicester and Leicestershire Enterprise Partnership	Meeting to discuss impacts of the Proposed Scheme in the Leicestershire area
Leicestershire Princes Trust	Meeting to discuss the potential impact of the Proposed Scheme and potential employment opportunities through the supply chain
Ashby School	Meeting to discuss the impact of the Proposed Scheme on the commute of students and staff, and also the educational opportunities

Local authorities and parish councils

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

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

3.4.8 Key issues identified during engagement with local authorities and parish councils include those summarised in Table 10.

Table 10: Engagement to date with local authorities and parish councils.

Stakeholder	Area of focus
Leicestershire County Council	Engagement to provide information on the Proposed Scheme and gather any feedback and concerns
	Meeting to discuss sensitive ecological receptors, plans for mitigation and gather information to assist the ecological assessment within the Working Draft Environmental Statement (WDES)
	Engagement around the landscape and visual assessment and to discuss representative view point and photomontage locations
North West Leicestershire District Council	Engagement to provide an update on the Proposed Scheme and understand the local conditions and factors to inform scheme design and WDES. In addition, discussion of future viability of developments such as Measham Wharf housing development and the Ashby Canal Restoration project
	Meetings with technical leads to collate data and discuss key assessment topics including: air quality, land quality; sound, noise and vibration, and waste.
	Engagement around the landscape and visual assessment and to discuss representative view point and photomontage locations
East Midlands Councils	Engagement to provide an update on the Proposed Scheme and understand the local conditions and factors to inform scheme design and WDES
	Meeting to discuss likely impacts to highways, including local roads, trunk roads and highway assets
	Meeting to discuss the traffic and transport assessment and gaining understanding of key local constraints
	Meeting to discuss development of the East Midlands Hub station
	Meeting to discuss participation in the East Midlands Councils' HS2 mitigation group
Appleby Magna Parish Council	Engagement to provide information on the Proposed Scheme and gather any feedback and concerns
Measham Parish Council	Engagement to provide information on the Proposed Scheme and gather any feedback and concerns
Ashby-de-la-Zouch Town Council	Engagement to provide information on the Proposed Scheme and gather any feedback and concerns from the Planning and Transportation Committee
Packington Parish Council	Engagement to provide information on the Proposed Scheme and gather any feedback and concerns
Oakthorpe, Donisthorpe and Acresford Parish Council	Engagement to provide information on the Proposed Scheme and gather any feedback and concerns
Snarestone Parish Council	Communication to provide information on the Proposed Scheme and gather any feedback and concerns
Stretton en le field Parish Council	Communication to provide information on the Proposed Scheme and gather any feedback and concerns
Twycross Parish Council	Communication to provide information on the Proposed Scheme and gather any feedback and concerns
Midlands Connect	Engagement to provide information on the Proposed Scheme and gather any feedback and concerns

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

Expert, technical and specialist groups

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

- Animal and Plant Health Agency;
- Ashby Canal Association;
- Ashby Canal Trust;
- British Geological Survey;
- Campaign to Protect Rural England;
- Canal & River Trust;
- Coal Authority;
- Department of Environment, Food and Rural Affairs;
- Environment Agency;
- FERA Science Ltd;
- Forestry Commission;
- Highways England;
- Historic England;
- Inland Waterways Association;
- Leicestershire and Rutland Wildlife Trust;
- National Farmers Union;
- National Forest Company;
- National Trust;
- Natural England;
- Network Rail;
- Public Health England;
- Ramblers Association;

[16] Supporting document: Draft Code of Construction Practice

- Royal Agricultural Society;
- Royal Society for the Protection of Birds;
- Royal Society of Wildlife Trusts/The Wildlife Trusts; and
- Woodland Trust.

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

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

Utilities

3.4.13 Engagement is also ongoing with utility companies and statutory stakeholders such as Network Rail, Severn Trent Water, Cadent and the Oil and Pipelines Agency to establish what infrastructure exists in the Appleby Parva to Ashby-de-la-Zouch area and how it may need to be modified as part of the Proposed Scheme.

Directly affected individuals, major asset owners and businesses

3.4.14 This group includes those with property potentially affected by the Proposed Scheme, including individuals, major asset owners and businesses within the Appleby Parva to Ashby-de-la-Zouch area.

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

3.4.16 Information gathered from 10 farm visits have informed the assessment presented in this working draft ES. Farm visits are ongoing and engagement will continue as the design and assessment develops.

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

3.4.18 A route-wide programme of engagement is ongoing, in parallel to the working draft ES process. This engagement provides affected individuals, major asset owners and businesses the opportunity to raise issues and opportunities in relation to the Proposed Scheme and to gain an understanding of compensation and assistance available for property owners. Within the Appleby Parva to Ashby-de-la-Zouch area, an information event was held at Measham Leisure Centre on 12 July 2018. Facilities were available at the event for affected individuals, major asset owners and businesses to have private meetings with HS2 staff.

3.4.19 Engagement has been undertaken with WTI Fasteners, Harworth Group, Cameron Homes, British Car Auctions, Plastic Omnium, Pearce Brothers Ltd, Measham Land Development Company, and LeCC (on behalf of Huntingdon Court businesses).

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

4 Agriculture, forestry and soils

4.1 Introduction

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

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

4.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2: LA03 Map Book.

4.2 Scope, assumptions and limitations

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

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

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

[17] To be prepared for Phase 2b in due course, as per previous Phases found here: https://www.gov.uk/government/publications/hs2-guide-for-farmers-and-growers
[18] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report
[19] Ministry of Agriculture, Fisheries and Food (1988), Agricultural Land Classification of England and Wales – Revised guidelines and criteria for grading the quality of agricultural land.

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

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

4.2.5 The primary functions provided by soils, other than for food and biomass production, such as flood water attenuation, carbon storage or the support of ecological habitats, are identified in this section and the ability of 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 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 have 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 Appleby Parva to Ashby-de-la-Zouch 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 Appleby Parva to Ashby-de-la-Zouch area is provided in Section 10, Land quality and Section 15, Water resources and flood risk.

4.3.3 The underlying geology of the study area is mapped by the British Geological Survey (BGS)[20]. Superficial deposits of alluvium are associated with the River Mease in the south of the study area and Gilwiskaw Brook in the north. The deposits normally include compressible silty clay, and can also include silt, sand, peat and gravel.

4.3.4 River terrace deposits of Quaternary sand and gravel are also mapped on the shallow, lower valley slopes associated with the River Mease and Gilwiskaw Brook.

4.3.5 Glacial till deposits overlie the Tarporley Siltstone bedrock to the south-west of Packington, occupying a plateau with a shallow downward slope to the east. The deposits form a sheet of diamicton, which is a group of sediments laid down by direct action of glacial ice and may contain material ranging from clay to boulders.

4.3.6 Glaciofluvial deposits comprising sand and gravel are mapped on a ridge and the upper slopes to the west of Packington, also overlying the Tarporley Siltstone.

4.3.7 In the south of the study area, and as far north as Measham, the bedrock comprises the Mercia Mudstone Group, which comprises the Sidmouth Mudstone Formation and the Tarporley Siltstone Formation. The Sidmouth Mudstone and Tarporley Siltstone formations generally include red-brown mudstones and siltstones, with occasional thin beds of dolomitic siltstone and sandstone.

4.3.8 Outcrops of the Sherwood Sandstone Group are found across the study area from Stretton en le Field to Measham and west of Packington, and include the Chester and Moira formations. There is also an outcrop of Helsby Sandstone to the east of Ashby-de-la-Zouch.

4.3.9 The Chester and Moira formations comprise conglomerates; the former with red-brown pebbly sandstones. The Moira Formation includes a sandy mudstone matrix with interbedded mudstones and sandstones.

4.3.10 North of Measham, there are several outcrops of the Pennine Lower and Middle Coal Measures formations which are characterised by interbedded mudstone, siltstone and sandstone. The Wingfield Flats Formation forms part of the Lower Coal Measures Formation and is dominated by sandstone.

Topography and drainage

4.3.11 Topography in this study area reflects the underlying geology, with the valleys of the River Mease and the Gilwiskaw Brook cut into underlying siltstones, which are more easily eroded than the surrounding sandstones and conglomerates.

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

4.3.12 The siltstone plateau to the south-west of Measham is located up to 105m above Ordnance Datum (AOD), with shallow valley sides to the River Mease, which lies at up to 80m AOD. The plateau at Packington is located at up to 130m AOD, with the Gilwiskaw Brook in its channel located at up to 115m AOD. The topography between the two river valleys is undulating and characterised by shallow, but often irregular, gradients of less than seven degrees. Altitudes are typically between 115m and 125m AOD.

4.3.13 Agricultural land at risk of flooding by rivers is confined to the floodplains of the River Mease and Gilwiskaw Brook, and Coleorton Brook, which is a tributary of the latter. This land is classed as predominantly Flood Zone 3, on the Environment Agency's Flood map[21], in which there is a 1 in 100 or greater annual probability of flooding. Further details are provided in Section 15, Water resources and flood risk.

Description and distribution of soil types

4.3.14 The broad characteristics of the soils likely to be present in this study area are described by the Soil Survey of England and Wales[22] and their general distribution is shown on the National Soil Map[23]. Soils possessing similar characteristics are amalgamated into associations.

4.3.15 There are three groups of mapped soil associations likely to be present in this study area. The presence of the two main groups has been confirmed in parts of the study area by published survey data.

4.3.16 The most prevalent group comprises clay loam or occasionally sandy silt loam or sandy clay loam topsoils over clay, or clay loam subsoils of the Hodnet, Bardsey and Flint associations. These soils are typically imperfectly drained and are classified as of Wetness Class[24] (WC) III, though Hodnet soils may also be WC II and Bardsey soils WC IV. Soils within this group were identified in a detailed survey undertaken to the south-west of Measham[25].

4.3.17 The second most prevalent group comprises coarse-textured topsoils of sandy loam, sandy silt loam or loamy sand, overlying sandy loam, loamy sand or sand, or occasionally sandstone. This group comprises the Bromsgrove, Bridgnorth and Wick 1 associations. Soil profiles are well drained, of WC I and may be slightly or moderately droughty. Soils within this group were also identified in a published survey undertaken to the south-west of Measham.

4.3.18 The least prevalent group comprises alluvial soil of the Fladbury 1 association in river floodplains. These soils are typically clayey throughout the profile. They are affected by groundwater and are waterlogged for long periods in winter, such that they are poorly to very poorly drained (WC IV to VI).

[21] Environment Agency's Flood map. Available online at: https://flood-map-for-planning.service.gov.uk/
[22] 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.
[23] Cranfield University (2001), *The National Soil Map of England and Wales 1:250,000 scale.* Cranfield University: National Soil Resources Institute.
[24] 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.
[25] MAFF (1993), Agricultural Land Classification, Land off Tamworth Road, Measham, Leicestershire, ref 109/93

Soil and land use interactions

Agricultural land quality

4.3.19 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.

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

4.3.21 Climate within the study 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 droughtiness[26] limitations of the land.

4.3.22 The local agro-climatic data have been interpolated from the Meteorological Office's standard 5km grid point dataset[27] for three representative points within the study area. The data show the area to have a moderately cool climate with moderate to moderately low rainfall. The number of Field Capacity Days[28] (FCDs), when the moisture deficit[29] is zero, ranges from 146 to 153 days per annum, which is average for lowland England (150 days). Moisture deficits, which give an indication of the liability of soils to droughtiness in summer, are moderate.

4.3.23 Site factors include flooding, which affects agricultural land quality within the valleys of the River Mease and Gilwiskaw Brook and limits land quality to Subgrade 3b. Further details are provided in Section 15, Water resources and flood risk. There are no gradient limitations to agricultural land quality in this area.

4.3.24 The main physical limitations that result from interactions between soil, climate and site factors are soil wetness, soil droughtiness and a 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.

4.3.25 Soils in the most extensive group of associations have been identified in survey data to the south-west of Measham[30] Topsoil textures of medium clay loam and sandy clay loam overlie heavy (silty) clay loam or silty clay subsoil horizons, which are slowly permeable. Profiles are mostly of WC III and are limited by wetness and workability to Subgrade 3a.

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[26] 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
[27] Meteorological Office (1989), *Gridpoint Meteorological data for Agricultural Land Classification of England and Wales and other Climatological Investigations*.
[28] 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.
[29] 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.

4.3.26 Poorly drained profiles of WC IV with heavy clay loam or medium clay loam topsoils over slowly permeable subsoil horizons are limited by wetness and workability to Subgrade 3b.

4.3.27 The second group of soil associations, comprising well drained (WC I), coarse-textured soil profiles in the Bromsgrove, Bridgnorth and Wick 1 associations, is affected mostly by soil droughtiness, but generally only slightly. The severity of limitation is determined by factors such as topsoil texture, stone content and depth to the sandstone bedrock. As moisture deficits are moderate, droughtiness limitations are mostly slight to Grade 2, although Subgrade 3a land may occur where sand and sandstone lower horizons are present at shallow depths.

4.3.28 Published survey data in the south of the study area[30] have confirmed that sandy silt loam topsoils over sandy loam subsoils are classified as Grade 2 as a result of slight soil droughtiness and wetness limitations, with profiles mostly of WC II or III.

4.3.29 The third group of soils, comprising alluvial soils associated with the River Mease and Gilwiskaw Brook are likely to be waterlogged for long periods throughout the year, of WC IV or V. Combined with clayey topsoil textures under the climatic conditions of the study area, these soils are limited to Subgrade 3b or Grade 4.

4.3.30 As set out in the SMR, the sensitivity of BMV land in the study area is determined relative to the abundance of such land in the area, set as a 4km corridor centred on the route of the Proposed Scheme. Department for Environment, Food and Rural Affairs (Defra) predictive mapping[30] shows that there is a high likelihood of encountering BMV agricultural land in the locality, which makes such land a resource of low sensitivity in this study area.

4.3.31 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 ALC. The results will be reported in the formal ES.

Other soil interactions

4.3.32 Soil fulfils a number of functions and services for society in addition to those of food and biomass production, which are central to social, economic and environmental sustainability. These are outlined in sources such as the Soil Strategy for England[31] and the Government's White Paper, The Natural Choice: securing the value of nature[32], 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;

[30] Defra (2005), *Likelihood of Best and Most Versatile Agricultural Land*.
[31] Defra (2009), *Soil Strategy for England.*
[32] HM Government (2011), *The Natural Choice: securing the value of nature.*

- the protection of cultural heritage;
- the provision of raw materials; and
- the provision of a platform for human activities, such as construction and recreation.

4.3.33 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.

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

Land use

Land use description

4.3.35 Land in this study area is primarily in agricultural use. Generally small to medium sized mixed arable and livestock holdings are found throughout the area. There are some smaller, non-commercial, holdings particularly around the villages of Appleby Magna, Measham and Packington.

4.3.36 Woodland in this area is extensive to the north-east of Measham, where independent woodlands, including Parker's Wood, Fiveways Wood and Willesley Wood, have been planted either side of the A42 as part of the National Forest initiative. The largest block is Willesley Wood, which was planted on 56ha of restored opencast coal workings and is managed by The Woodland Trust. Willesley Wood comprises a mixture of new broadleaved plantation and mature secondary woodland with smaller areas of grassland and wetland. It is managed primarily as a sustainable, self-regenerating woodland habitat, which is open to the public as a recreational facility.

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

4.3.38 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.

4.3.39 The majority of 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 with land entered into an agri-environment scheme have been identified in Table 11, and cover a high proportion of land within the study area, particularly between Measham and Packington.

Number, type and size of holdings

4.3.40 Table 11 sets out the current understanding of main farm holdings within this study area. The details of holdings have been obtained from face-to-face interviews with farm owners and occupiers. Publicly available sources have been used to obtain information about farm holdings where it has not yet been possible to arrange interviews, and this information will be validated as survey work continues. Other farm holdings may be identified as survey work continues and the design develops. Effects on these farm holdings will be reported in the formal ES.

4.3.41 Table 11 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 11: Summary of characteristics of holdings

Holding name	Holding type	Holding size (ha)	Diversification	Agri-environment scheme	Sensitivity to change
Dingle Farm	Arable and livestock	121	None	None	Medium
West Hill Farm	Arable and livestock	90	None	ELS	Medium
Red Bank Farm Manor House Farm Lowlands Farm	Arable and beef cattle	365	None	ELS and HLS	Medium
Side Hollows Farm	Arable and livestock	133	None	None	Medium
Land to the north of Measham Road*	Rough grassland	15	None	None	Low
Treetops Farm*	Equestrian (non-	2	Not known	None	Low

Holding name	Holding type	Holding size (ha)	Diversification	Agri-environment scheme	Sensitivity to change
	commercial)				
Park Farm (part of Gopsall House Farm)	Arable and equestrian	1080	40ha Ashby Solar Farm, haulage business, property lets, storage	HLS and ELS	Medium
Manor Farm	Mixed arable and livestock	83	Farm buildings let for office and light industrial uses	HLS and ELS	Medium
Land to the east of Ashby Road*	Grassland, cattle grazing	8	Not known	None	Medium
Barleydown Farm	Mixed arable and livestock	117	None	Farm Woodland Premium Scheme	Medium
Prestop Park Farm*	Woodland and grassland	25	None	None	Low
Roecliffe Farm	Arable, grassland and woodland	85	None	Farm Woodland Premium Scheme	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) 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[33] and relate to:

- the reinstatement of agricultural land that is used temporarily during construction to agriculture, where this is the agreed end use (Section 6);
- the provision of a method statement within the farm pack for stripping, handling, storing and replacing agricultural and woodland soils to reduce risks associated with soil degradation on areas of land to be returned to agriculture and woodland following construction, based on detailed soil survey work to be

[33] Supporting document: Draft Code of Construction Practice

undertaken prior to construction. This would include any remediation measures necessary following the completion of works (Section 6);

- special provisions for handling peat and peaty soils, where the disturbance of these soils cannot be avoided (Section 6);a requirement for contractors to monitor and manage flood risk and other extreme weather events, insofar as reasonably practicable, that may affect agriculture, forestry and soil resources during construction (Sections 5 and 16);
- arrangements for the maintenance of farm and field accesses affected by construction (Section 6);
- the protection and maintenance of existing land drainage and livestock water supply systems, where reasonably practicable (Sections 6 and 16);
- the protection of agricultural land adjacent to the construction site, including the provision and maintenance of appropriate stock-proof fencing (Sections 5, 6, 9 and 12);
- the adoption of measures to control the deposition of dust on adjacent agricultural crops (Section 7);
- the control of invasive and non-native species; and the prevention of the spread of weeds generally from the construction site to adjacent agricultural land (Section 9);
- the adoption of measures to prevent, insofar as reasonably practicable, the spread of soil-borne, tree, crop and animal diseases from the construction area (Sections 6 and 9); and
- liaison and advisory arrangements with affected landowners, occupiers and agents, as appropriate (Sections 5 and 6).

4.4.3 As part of the ongoing development of the design, measures will be incorporated to avoid or mitigate adverse impacts on agriculture, forestry and soils.

4.4.4 In the Appleby Parva to Ashby-de-la-Zouch area, the severance of agricultural land would be mitigated primarily by the realignment and reinstatement of public highways, such as Tamworth Road and the B4116 Measham Road. However, the ongoing design of the Proposed Scheme will continue to assess the requirement for agricultural access to severed land parcels. Examples include:

- the Manor House accommodation access diversion to mitigate severance and provide access to Manor House Farm (see Volume 2: Map CT-06-413, I5 to CT-06-413, B5); and
- the Vicarage Lane overbridge and the Leicestershire Bridleway O70/1 realignment, which would link to the A42 overbridge that enables Manor Farm to access agricultural land to the north of the A42 Farm (see Volume 2: Map CT-06-417, D5 to E6).

4.4.5 The effect of severance of agricultural land for Side Hollows Farm would be reduced by the ability of agricultural machinery to pass under the River Mease viaduct (see Volume 2: Map CT-06-414, F6).

4.4.6 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.

4.4.7 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 Fladbury 1 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

4.4.8 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.

4.4.9 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

4.4.10 Interpretation of publicly available data show that the Proposed Scheme is likely to require approximately 200ha of agricultural land within the Appleby Parva to Ashby-de-la-Zouch area during the construction phase, of which approximately 140ha (70%) are likely to be classified as BMV land (Grades 2 and 3a). This is a high magnitude of impact on BMV land.

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

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

Nature of the soil to be disturbed

4.4.13 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.

4.4.14 Successful soil handling is dependent upon movements being undertaken under appropriate weather and ground conditions using the appropriate equipment. The principles of soil handling are well established and set out in advisory material such as Defra's Code of Practice for the Sustainable Use of Soils[34]. These principles would be followed throughout the construction period.

4.4.15 Clayey, alluvial and seasonally waterlogged soils (including Hodnet, Bardsey, Flint and Fladbury 1 associations) are least able to remain structurally stable if moved in wet conditions or by inappropriate equipment. They are susceptible to compaction and smearing, which could affect successful reinstatement.

4.4.16 The disturbance of peat soils has implications for carbon emissions and biodiversity. Design development of the Proposed Scheme would seek to reduce disturbance of any deep peat soils as far as possible. Where disturbance cannot be avoided, the peat soils would be handled with particular care to avoid compaction when wet and wind erosion when dry. When reinstated, opportunities would be taken to use peat soils to create habitats, enhance biodiversity and build carbon reserves.

4.4.17 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 soils and the assessment of the effects on soils to be disturbed will be reported in the formal ES.

Impacts on holdings

4.4.18 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.

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

During the construction period, some agricultural land would be restored and the impact on individual holdings would reduce.

The effects of the Proposed Scheme on individual agricultural and related interests during the construction period will be reported in the formal ES. The formal ES will present the total area of land required on a particular holding during the construction period in absolute terms and as a percentage of the total area farmed. It will also show the area of land that would be returned to the holding following the construction period. The disruptive effects, principally of construction noise and dust, will be reported in the formal ES and assessed according to their effects on land uses and enterprises.

4.4.19 The potential temporary effects from the construction of the Proposed Scheme on individual agricultural and related interests are summarised in Table 12 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.

4.4.20 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 12: Summary of temporary effects on holdings from construction

Holding name/sensitivity to change	**Land potentially required**	**Potential severance impact**	**Potential scale of effect**
Dingle Farm Medium sensitivity	High	Medium	Major/moderate adverse
West Hill Farm Medium sensitivity	High	Negligible	Major/moderate adverse
Red Bank Farm Manor House Farm Lowlands Farm Medium sensitivity	Low	Medium	Moderate adverse
Side Hollows Farm Medium sensitivity	High	Low	Major/moderate adverse
Land to the north of Measham Road Low sensitivity	High	Negligible	Moderate adverse
Treetops Farm Low sensitivity	High	Negligible	Moderate adverse
Park Farm (part of Gopsall House Farm)	Negligible	Medium	Moderate adverse

Holding name/sensitivity to change	Land potentially required	Potential severance impact	Potential scale of effect
Medium sensitivity			
Manor Farm Medium sensitivity	High	Medium	Major/moderate adverse
Land to the east of Ashby Road Medium sensitivity	High	Negligible	Major/moderate adverse
Barleydown Farm Medium sensitivity	Low	Negligible	Minor adverse
Prestop Park Farm Low sensitivity	Medium	Negligible	Minor adverse
Roecliffe Farm Medium sensitivity	Low	Negligible	Minor adverse

4.4.21 Overall, the construction of the Proposed Scheme would be likely to temporarily affect 12 holdings in the Appleby Parva to Ashby-de-la-Zouch area. On the basis of information currently available, nine holdings would be likely to experience moderate or major/moderate adverse effects during construction, which would be significant for each holding.

4.4.22 Five farm holdings would be likely to experience major/moderate adverse temporary effects, largely due to the proportion of land required for the Proposed Scheme during the construction phase. Four holdings would be likely to experience moderate adverse effects, either due to a large proportion of land required from small holdings or a relatively low proportion of land from large holdings.

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

Permanent effects of construction

Impacts on agricultural land

4.4.24 Interpretation of publicly available data show that the Proposed Scheme would be likely to require approximately 110ha of agricultural land permanently within the Appleby Parva to Ashby-de-la-Zouch area, of which approximately 80ha (73%) are likely to be classified as BMV land (Grades 2 and 3a). This would be a high magnitude of impact on BMV land.

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

Impacts on forestry land

4.4.26 It is currently expected that a section of Parker's Wood and Fiveways Wood to the north of Measham would be required for the Proposed Scheme, including the construction of Willesley Wood Side cutting and the realignment of the A42. The requirement would cause a partial loss of the woodland resource and the recreational facility provided by the woodland, although there are unlikely to be any significant adverse forestry or management effects arising. 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, and the effects on the recreational facility in Section 6, Community.

Impacts on holdings

4.4.27 The potential permanent effects from the construction of the Proposed Scheme on individual agricultural and related interests are summarised in Table 13 for those holdings currently identified. The scale of the impact of land required to operate the Proposed Scheme is based on the likely proportion of land required from the holding. The potential effects of severance are judged on the ease and availability of access to severed land once construction is completed. The impact on farm infrastructure refers mainly to the potential loss of or damage to farm capital, such as property, buildings and structures, and the consequential effects on land uses and enterprises.

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

Table 13: 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**
Dingle Farm Medium sensitivity	Medium	Medium	Low	Moderate adverse
West Hill Farm Medium sensitivity	Medium	Negligible	Low	Moderate adverse
Red Bank Farm Manor House Farm Lowlands Farm Medium sensitivity	Negligible	Medium	Low	Moderate adverse
Side Hollows Farm Medium sensitivity	Medium	Low	Low	Moderate adverse
Land to the north of Measham Road Low sensitivity	High	Negligible	Negligible	Moderate adverse
Treetops Farm Low sensitivity	High	Negligible	High	Moderate adverse

Holding name/ Sensitivity to change	Land potentially required	Potential severance impact	Potential impact on farm infrastructure	Potential scale of effect
Park Farm (part of Gopsall House Farm) Medium sensitivity	Negligible	Medium	Medium	Moderate adverse
Manor Farm Medium sensitivity	High	Medium	Medium	Major/moderate adverse
Land to the east of Ashby Road Medium sensitivity	High	Negligible	Low	Major/moderate adverse
Barleydown Farm Medium sensitivity	Negligible	Negligible	Low	Minor adverse
Prestop Park Farm Low sensitivity	Medium	Negligible	Negligible	Minor adverse
Roecliffe Farm Medium sensitivity	Low	Negligible	Negligible	Minor adverse

4.4.29 Overall, the construction of the Proposed Scheme could potentially affect 12 holdings in the Appleby Parva to Ashby-de-la-Zouch area permanently. On the basis of information currently available, nine would be likely to experience moderate or major/moderate adverse permanent effects from construction, which would be significant for each holding.

4.4.30 Two farm holdings would be likely to experience major/moderate adverse permanent effects, largely due to the proportion of land required for the Proposed Scheme. Seven holdings would be likely to experience moderate permanent adverse effects. Most of these would be holdings of medium sensitivity that would experience medium land required or severance impacts, although two would be low sensitivity holdings that would experience high impacts of land required and the demolition of all buildings at Treetops Farm.

4.4.31 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

4.4.32 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 Appleby Parva to Ashby-de-la-Zouch area, current indications based on publicly available information are that the temporary and permanent effects on BMV agricultural land would be moderate adverse, which would be significant. The area of land required by ALC grade will be assessed and reported in the formal ES.

4.4.35 Nine of the 12 farm holdings identified are likely to experience moderate or major/moderate adverse temporary and permanent effects during and following construction, which would be significant for each holding.

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

4.5 Effects arising from operation

Avoidance and mitigation measures

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

Assessment of impacts and effects

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

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

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

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

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

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

Other mitigation measures

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

Summary of likely residual significant effects

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

Monitoring

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

4.5.9 There are no area-specific requirements identified for monitoring agriculture, forestry and soil during the operation of the Proposed Scheme in the Appleby Parva to Ashby-de-la-Zouch 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 Appleby Parva to Ashby-de-la-Zouch area. Oxides of nitrogen (NOx) including nitrogen dioxide (NO2), fine particulate matter[35] (PM10, PM2.5) and dust have been considered in the assessment. Emissions of all or some of these air pollutants are likely to arise from construction activities, demolition, site preparation works and the use of site haul routes. Emissions would also arise from road traffic during construction and operation of the Proposed Scheme.

5.1.2 Engagement with North West Leicestershire District Council (NWLDC) has commenced and is ongoing. The purpose of this engagement has been to obtain relevant baseline information, which includes monitoring data in this area.

5.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2: LA03 Map Book.

5.2 Scope, assumptions and limitations

5.2.1 The scope, assumptions and limitations for the air quality assessment are set out in Volume 1, Section 8 and the Scope and Methodology Report (SMR)[36].

5.2.2 The study areas for the air quality assessment have been determined on the basis of where impacts on local air quality may occur[37]:

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

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

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

5.2.4 The assessment of construction traffic impacts will use traffic data based on an estimate of the average daily flows in the peak year during the construction period (2023-2032). The assessment will assume vehicle emission rates and background pollutant concentrations from 2023. As both pollutant emissions from vehicle exhausts and background pollutant concentrations are anticipated to reduce year by year as a result of vehicle emission controls, the year 2023 represents the worst case for the construction assessment.

5.3 Environmental baseline

Existing baseline

Background air quality

5.3.1 The main sources of air pollution in the Appleby Parva to Ashby-de-la-Zouch area are emissions from road vehicles and agricultural activities. The main roads within the area are the M42, the A42, the A444 Atherstone Road, Tamworth Road, Rectory Lane, Huntingdon Way, Repton Road, Burton Road, New Street, the B4116 Ashby Road, Leicester Road, the A512 Ashby Road and the A511 Ashby Road.

5.3.2 There are four industrial installations (regulated by the Environment Agency) with permits for emissions to air, namely Blackberry Farm, Bardon Acetylene Plant, Bardon Hill Quarry and New Albion Landfill Site. 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)[38] for the baseline year of 2017. The data are estimated for 1km grid squares for NOx, NO2, PM10 and PM2.5. Background concentrations are within the air quality standards for all pollutants within the Appleby Parva to Ashby-de-la-Zouch area.

Local monitoring data

5.3.4 There is currently one local authority diffusion tube site located within the Appleby Parva to Ashby-de-la-Zouch area for monitoring NO2 concentrations. Measured concentrations in 2016 were within the air quality standard[39].

Air quality management areas

5.3.5 There are no air quality management areas (AQMA) within the Appleby Parva to Ashby-de-la-Zouch area.

Receptors

5.3.6 Several locations have been identified in the area as sensitive receptors, which are considered to be susceptible to changes in air quality due to their proximity to dust

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

generating activities or traffic routes during construction or operation of the Proposed Scheme.

5.3.7 Most of the receptors which may be affected by the Proposed Scheme are residential. Other receptors include various schools and businesses.

5.3.8 There is one statutory designated ecological site identified within the Appleby Parva to Ashby-de-la-Zouch area, namely the River Mease Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI). Other non-statutory sensitive ecological sites identified close to the Proposed Scheme include the Park Farm Woodland Local Wildlife Site (LWS) and Packington Churchyard 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). 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 of earthworks.

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

Assessment of impacts and effects

Temporary effects

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

Construction dust effects

5.4.5 The risks of demolition of existing buildings, earthworks, construction of new structures and trackout[40], have been assessed for their effect on dust soiling, human health[41] and ecological sites. There are residential and ecological receptors located within the Appleby Parva to Ashby-de-la-Zouch area.

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

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

Construction traffic effects

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

5.4.9 The M42, the A42, the A444 Atherstone Road, the A511 Ashby Road, the B5493 (south-west of the M42 junction 11), Tamworth Road, Huntingdon Way, Burton Road/Measham Road (Measham), Measham Road/Bridge Street/Heather Lane (Packington), Normanton Road/Coleorton Lane, Corkscrew Lane, Vicarage Lane and Leicester Road (New Packington) 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, the A512 Ashby Road, Repton Road, New Street, the B4116 Measham Road, and Ashby Road (north of Packington). A detailed assessment of air quality impacts from traffic emissions in the area will be undertaken and reported in the formal ES.

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

[40] 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.
[41] Human health effects relate mainly to short-term exposure to particles of size between 2.5µm to 10µm, measured as PM10.

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 effect

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

5.5 Effects arising from operation

Avoidance and mitigation measures

5.5.1 No specific mitigation measures for air quality are proposed to address the operation of the Proposed Scheme.

Assessment of impacts and effects

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

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

Operational traffic effects

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

Other mitigation measures

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

Summary of likely residual significant effects

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

Monitoring

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

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

6 Community

6.1 Introduction

6.1.1 This section of the report describes the impacts and likely significant effects identified to date on local communities resulting from the construction and operation of the Proposed Scheme in the Appleby Parva to Ashby-de-la-Zouch area.

6.1.2 The assessment draws on information gathered from engagement with the users and operators of community facilities, including Leicestershire County Council (LeCC), Leicestershire Local Access Forum, North West Leicestershire District Council (NWLDC), Appleby Magna Parish Council, Measham Parish Council, Oakthorpe Parish Council, Packington Parish Council, Packington Resident's Group and Measham Residents Group. The purpose of this engagement has been to understand how the 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: LA03 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)[42].

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

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

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

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

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

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

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

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

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

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

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

6.3 Environmental baseline

6.3.1 The Proposed Scheme through the Appleby Parva to Ashby-de-la-Zouch area would be approximately 12.8km in length and lies within the local authority areas of NWLDC and LeCC. The Proposed Scheme would extend from Appleby Parva in the south, passing close to the settlements of Appleby Magna, Measham, Oakthorpe, Ashby-de-la-Zouch and Packington.

6.3.2 The Appleby Parva to Ashby-la-Zouch area is predominantly rural in nature, with agriculture being the main land use. Agricultural land is interspersed with woodland, small villages and a scattering of isolated dwellings and farmsteads. The main concentration of community facilities is in the larger settlements of Measham and Ashby-de-la-Zouch. The hamlet of Appleby Parva and the villages of Appleby Magna, Oakthorpe and Packington provide fewer local services.

Appleby Magna and surrounds

6.3.3 This area covers the village of Appleby Magna and the hamlet of Appleby Parva. Together they have approximately 500 residential properties.

6.3.4 Appleby Magna is a village comprising approximately 450 residential properties. Appleby Magna is located to the east of the route of the Proposed Scheme, the nearest residential properties would be on the route of the Proposed Scheme. Appleby Magna provides a range of community resources within the study area. Notable resources include St. Michael and All Angels' Church, two public houses (The Black Horse and Crown Inn), Appleby Magna post office containing a village shop, Appleby Magna Cricket Club, Happy Hedgehogs Pre School, and an outdoor play area.

6.3.5 To the north of Appleby Magna, at the Measham Road and Tamworth Road junction, there is a parcel of woodland known as Georgina's Wood, which is a publicly accessible open space. Another notable open space is the allotment garden site on Rectory Lane, used by members of Appleby Magna Allotment Society. The allotments are on the western boundary of Appleby Magna, and would be approximately 150m from the route of the Proposed Scheme.

6.3.6 Appleby Parva is a hamlet located to the east of the route of the Proposed Scheme. The hamlet comprises approximately 50 residential properties. The nearest residential properties would be approximately 600m east of the route of the Proposed Scheme. Appleby Parva provides a range of community resources. The Appleby Inn Hotel and Restaurant and the Sir John Moore Church of England Primary School are within the study area.

Measham

6.3.7 The village of Measham comprises approximately 2,300 residential properties. The nearest residential properties would be adjacent to the route of the Proposed Scheme. Measham provides a wide range of services for the surrounding settlements including Appleby Magna, Appleby Parva and Oakthorpe.

6.3.8 Community resources within the study area include a variety of shops, public houses and restaurants on the High Street. Measham also provides health care facilities, including Measham Dental Practice, Measham Medical Centre, Dean and Smedley Pharmacy and Measham Opticians.

6.3.9 There are two primary schools in Measham, the St. Charles Catholic Primary School and Measham Church of England Primary School. There is also a Lively Learner's Pre-School and a Surestart Family Centre, both located in Measham Church of England Primary School. There are religious facilities, including Measham Methodist Church, Measham Baptist Church and St. Laurence Church of England Church.

6.3.10 The Ivanhoe Way, Ashby Woulds Heritage Trail and the National Cycle Network (NCN) Route 63 all follow the same section of multi-user trail (referred to singularly as NCN Route 63 for this section), which passes through Measham to the north of Burton Road where it would be crossed by the route of the Proposed Scheme. The Ivanhoe Way is a long-distance walk, a 56km circular recreational route. It hosts occasional one-off events such as The Ivanhoe Way Challenge, an annual charity walk.

6.3.11 To the north of Measham there are areas of publicly accessible woodland located along the A42, including Fiveways Wood and Willesley Wood. Fiveways Wood and Willesley Wood are linked on their northern edges by the Leicestershire Bridleway P8/1 and Leicestershire Bridleway P8/2, which runs along Willesley Wood Side. These areas of woodland provide open space for the local community and incorporate a network of paths.

Oakthorpe

6.3.12 Oakthorpe is a village comprising approximately 1,200 residential properties. The nearest residential properties would be approximately 100m north-west of the route of the Proposed Scheme. Oakthorpe is connected to Measham to the south-east by New Street, which runs over the A42. Measham provides most of the services for Oakthorpe.

6.3.13 Within the study area are Oakthorpe Primary School and Little Oak Pre-School. Oakthorpe Community Leisure Centre is the base for Oakthorpe Athletic Football Club and provides a meeting space and a multi-use games area. There are two public houses, The Holly Bush Inn and Shoulder of Mutton.

Packington

6.3.14 Packington is a village comprising approximately 350 residential properties. The nearest residential properties are located approximately 50m south-east of the route of the Proposed Scheme. The route of the Proposed Scheme would pass over the Gilwiskaw Brook viaduct, which would be located 500m to the north-west of the village centre. There are scattered residential properties between Packington and Measham, including Park Farm located on Willesley Wood Side, which would be adjacent to the route of the Proposed Scheme.

6.3.15 Packington provides several community facilities, including Packington Church of England Primary School, Packington Play Group, Packington Memorial Hall, Bethany Ministries Church and the Church of the Holy Rood.

6.3.16 The Leicestershire Bridleway O70/1 connects Packington to Ashby-de-la-Zouch. It forms part of the National Forest Way, which is a long-distance walking trail that extends approximately 121km from the National Memorial Arboretum in Staffordshire to Beacon Hill Country Park in Leicestershire. It hosts a range of events including charity runs and marathons. The National Forest Way leaves Packington to the north-east and follows the A42 for approximately 300m before heading north towards Ashby-de-la-Zouch where it joins Packington Road.

6.3.17 Stonehouse Farm Equestrian Centre and Hillview Livery Packington provide other recreational resources in the area.

Ashby-de-la-Zouch

6.3.18 Ashby-de-la-Zouch is a town comprising approximately 6,000 residential properties. The nearest residential properties are located immediately north-west of the A42 and would be approximately 50m north-west of the route of the Proposed Scheme.

6.3.19 Within the study area there are numerous restaurants, cafés, shops, public houses and health care facilities. The town also provides Ashby Willesley Primary School and Manor House School. There are religious and community facilities, including St. Thomas' Church, Ashby Evangelical Church, St. Helen's Church and Ashby-de-la-Zouch Community Centre.

6.3.20 Ashby-de-la-Zouch has recreational resources within the study area, including tennis courts, a cricket ground, Willesley Park Golf Course and Ashby Ivanhoe Football Club.

6.3.21 There are several open spaces including Beech Wood, Roefield Wood, Normandy Wood, Sunnyside Wood, Western Park, Willesley Park, Ashby Depot Playing Fields and several play areas.

6.4 Effects arising during construction

Avoidance and mitigation measures

6.4.1 As part of design development, the following measures have been incorporated into the design of the Proposed Scheme to avoid or reduce potentially adverse effects on community resources, including the loss of residential properties:

- the relocation of a balancing pond to avoid a direct impact on the Rectory Lane allotment gardens on the western boundary of Appleby Magna;
- the realigned Tamworth Road has been designed to reduce impacts to Georgina's Wood, which is publicly accessible open space; and
- the New Street retaining wall in Measham would reduce the area of land required for the Proposed Scheme and reduce impacts on the residential properties at Windsor Way.

6.4.2 The draft Code of Construction Practice (CoCP[43]) includes a range of provisions that would help to mitigate community effects associated with construction within this area, including:

- implementation of a community engagement framework to provide appropriate information and resolve community issues (Section 5 of the draft CoCP);
- sensitive layout of construction sites to reduce nuisance as far as possible (Section 5);
- maintenance of public rights of way (PRoW) during construction where reasonably practicable (Section 14);
- monitoring and management of flood risk and other extreme weather events, where reasonably practicable, which may affect community resources during construction (Section 16);

[43] Supporting document: Draft Code of Construction Practice

- 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 (Section 7 and 13); and
- where practicable, the avoidance of HGVs operating adjacent to schools during drop off and pick up periods (Section 14).

Assessment of impacts and effects

Temporary effects

Residential properties

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

Community facilities

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

Recreational facilities

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

Open space and PRoW

6.4.6 Land required for the construction of the diversion of Rectory Lane would require the temporary loss of both vehicular and pedestrian access points to the Rectory Lane allotment gardens, used by members of Appleby Magna Allotment Society. The duration of construction would be approximately one year and six months, which would be followed by a period of reinstatement to enable the allotment plots to be gardened again. There are alternative allotments in Measham, but there is a waiting list for this resource. Proposed mitigation and an assessment of the likely effects will be reported in the formal ES.

6.4.7 The construction of the Ashby Canal Restoration underbridge, the River Mease viaduct north satellite compound and the construction of the Measham embankment No. 1 would result in the temporary severance of the NCN Route 63 where it would be crossed by the Ashby Canal Restoration underbridge. Temporary severance could deter cyclists and walkers and other users from using this route for leisure journeys. Proposed mitigation and an assessment of the likely effects will be reported in the formal ES.

6.4.8 The construction of the Measham embankment No.2 and the Willesley Wood Side cutting would result in the temporary loss of approximately 25ha of Fiveways Wood, which is located on both sides of the A42 and connected via the Leicestershire Bridleway P8/1 and P8/2. This would represent a loss of approximately 70% of Fiveways Wood for approximately three years. Fiveways Wood is located approximately 250m north of Measham. It is accessible from Measham Road and Willesley Wood Side, which are roads to the north-east of Measham. There is alternative woodland with a network of paths located at Willesley Wood, immediately

north and adjacent to Fiveways Wood. Willesley Wood is located approximately 1.5km north of Measham and is not considered an equivalent accessible alternative. The loss of Fiveways Wood including the signed trails would result in a major adverse effect, which would be significant.

6.4.9 The construction of the Measham Road Packington embankment and Measham Road Packington cutting would result in temporary severance of Leicestershire Bridleway O70/1, which forms part of the National Forest Way. This could deter cyclists and walkers from using the route as a leisure journey. The construction of the realigned Leicestershire Bridleway O70/1 bridleway would take approximately one year and one month. Proposed mitigation and an assessment of the likely effects will be reported in the formal ES.

Permanent effects

Residential properties

6.4.10 The land required for the Rectory Lane diversion and the Appleby Magna cutting, near the M42 junction 11, would require the demolition of four residential properties on Rectory Lane in Appleby Magna. These residential properties would be permanently lost.

6.4.11 New Street realignment would require the demolition of Tree Tops Farm on Measham Road. This residential property would be permanently lost.

6.4.12 Land required for the A42 Measham cutting would require the demolition of 27 residential properties on Amersham Way in Measham. The permanent loss of these properties would result in a major adverse effect, which would be significant.

6.4.13 Land required for the Willesley Wood Side cutting would require the demolition of eight properties on Willesley Wood Side, between Measham and Packington. The permanent loss of these properties would result in a moderate adverse effect, which would be significant.

6.4.14 Construction of the Ashby-de-la-Zouch cutting No.1 would require the demolition of one residential property on Leicester Road in Ashby-de-la-Zouch. This residential property would be permanently lost.

Community facilities

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

Recreational facilities

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

Open space and PRoW

6.4.17 Land required for the diversion of Rectory Lane would result in permanent loss of less than 0.1ha of the Rectory Lane allotment gardens and one of the two access points. This would represent a permanent loss of approximately 5% of the Rectory Lane allotment gardens. Following construction, access would be reinstated and the

allotments would not be permanently closed. Use could continue with the majority of the allotment space retained. The permanent loss of part of these allotment gardens would result in a minor adverse effect, which would not be significant.

6.4.18 The construction of the Measham embankment No.2 and Willesley Wood Side cutting would result in the permanent loss of approximately 8ha of Fiveways Wood. This would represent a permanent loss of approximately 20% of Fiveways Wood, and a loss of some of the signed paths through Fiveways Wood. The Leicestershire Bridleway P8/1 and P8/2 (which provides a connection for Fiveways Wood across the A42) would be diverted to the north-east along Willesley Wood Side diversion and the existing B4116 Measham Road to connect to the diverted Leicestershire Footpath P1/1. This is a permanent diversion of approximately 1km. Alternative woodland with a network of paths located at Willesley Wood is not as easily accessed from Measham as Fiveways Wood. The direct loss of part of Fiveways Wood and the signed trails within it, and the diversion of the bridleway would have an impact on users of Fiveways Wood. The permanent loss of part of Fiveways Wood would result in a moderate adverse effect, which would be significant.

6.4.19 Land required for the Measham Road Packington embankment and the Measham Road Packington cutting would result in permanent realignment of the Leicestershire Bridleway O70/1 (National Forest Way).The realignment would increase the length of the bridleway by approximately 400m, which is not expected to affect its use for recreation. The permanent realignment of Leicestershire Bridleway O70/1 would result in a negligible effect, which would not be significant.

Other mitigation measures

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

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

Summary of likely residual significant effects

6.4.22 Land required for construction of the Proposed Scheme is likely to result in temporary residual significant effects on Fiveways Wood near Measham.

6.4.23 Land required for construction of the Proposed Scheme is likely to result in permanent residual significant effects on the following community resources:

- loss of residential properties on Amersham Way in Measham;
- loss of residential properties on Willesley Wood Side, between Measham and Packington; and
- Fiveways Wood near Measham.

Cumulative effects

6.4.24 Community wide effects occur where a number of individual impacts on resources come together at 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.

6.4.25 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 at 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 Appleby Parva to Ashby-de-la-Zouch area as a consequence of the construction and operation of the Proposed Scheme. This includes effects on sites recognised or designated on the basis of their importance for nature conservation.

7.1.2 Engagement with stakeholders including Natural England, Environment Agency, The National Forest Company, Leicestershire and Rutland Wildlife Trust, and Leicestershire County Council (LeCC) 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 can be found in the Volume 2: LA03 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)[44].

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

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

7.3 Environmental baseline

Existing baseline

Introduction

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

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

7.3.2 Land required for the Proposed Scheme in the Appleby Parva to Ashby-de-la-Zouch area consists mainly of agricultural land, interspersed with woodland, with nearby villages and a scattering of isolated dwellings and farmsteads. The route of the Proposed Scheme in this area would pass through undulating topography across lowland landscapes with arable land, grassland, deciduous woodland and the floodplains of the River Mease, Gilwiskaw Brook and tributaries of Coleorton Brook. The route of the Proposed Scheme would run adjacent to the M42/A42 from south-west to north-east within the Appleby Parva to Ashby-de-la-Zouch area.

7.3.3 Statutory and non-statutory designated sites are shown on Map Series CT-10, Volume 2: LA03 Map Book.

Designated sites

7.3.4 There is one statutory designated site of international importance of potential relevance to the assessment in the Appleby Parva to Ashby-de-la-Zouch area. The River Mease Special Area of Conservation (SAC), covering an area of 21.9ha, is an internationally important site that would be crossed by the route of the Proposed Scheme on viaduct over the River Mease, south-west of Measham. The SAC includes a section of Gilwiskaw Brook, which at its closest point is 350m from the land required for the Proposed Scheme. The SAC is designated for two Annex II[45] species: spined loach and bullhead. The SAC also supports the Annex II species white-clawed crayfish and otter, listed as qualifying features but not a primary reason for site selection. The SAC supports the Annex I[46] habitat watercourses of plain to montane levels with *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, which is a qualifying feature but not a primary reason for site selection.

7.3.5 There is one nationally important site of special scientific interest (SSSI) of potential relevance to the assessment in the Appleby Parva to Ashby-de-la-Zouch area. This is the River Mease SSSI, which covers the same area of 21.9ha as the River Mease SAC, and is designated for its lowland clay river supporting nationally significant populations of spined loach and bullhead[47]. For this site, the Proposed Scheme in this area would be within the Impact Risk Zone[48] relevant to railway infrastructure as identified by Natural England. The SSSI would be crossed by the route of the Proposed Scheme south-west of Measham. The SSSI also includes part of the Gilwiskaw Brook, a tributary of the River Mease south of Packington. The section of Gilwiskaw Brook within the SSSI is at its closest point 350m from the land required for the Proposed Scheme.

7.3.6 There is one local nature reserve (LNR) of potential relevance to the assessment in the Appleby Parva to Ashby-de-la-Zouch area, which is up to county/metropolitan value. This is Saltersford Wood LNR, which covers an area of 5.6ha. The LNR has open water areas known as 'flashes', which result from mining subsidence and increases the risk of

[45] Species for which sites can be designated under the Habitats Directive are listed on Annex II of the EU Habitats Directive
[46] Annex I of the EU's Habitats Directive (1992) lists key habitat types whose conservation requires the designation of Special Areas of Conservation
[47] Natural England (2000) *River Mease Site of Special Scientific Interest.* Available online at: https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/2000416.pdf
[48] The Impact Risk Zones are a GIS tool developed by Natural England to make a rapid initial assessment of the potential risks to SSSIs posed by development proposals and indicate the types of development proposal which could potentially have adverse impacts.

flooding to Saltersford Brook. The site is also confirmed to support otter[49], common frog, common toad, kingfisher, bittern, peregrine and barn owl amongst other species. The LNR is north of Oakthorpe and at its closest point is 515m north of the land required for the Proposed Scheme.

7.3.7 For this assessment, formally notified LWS have been included here, and habitats within potential4 and deferred LWS are described below under the relevant habitat and species subsections. There are three local wildlife sites (LWS) of potential relevance to the assessment in the Appleby Parva to Ashby-de-la-Zouch area, each of which is of county/metropolitan value:

- Park Farm Woodland LWS[50] covering an area of 0.5ha. The woodland has Red Data Book species[51] present. Details of these will be reported in the formal ES. The LWS is located south-west of Packington, and is within the land required for the Proposed Scheme;
- Willesley Wood LWS covering an area of 9.4ha. The habitats within the LWS are broadleaved woodland, wet grassland and lake and the site supports Red Data Book species, the details of which will be reported in the formal ES. The LWS is located south-west of Ashby-de-la-Zouch, with the nearest point of the LWS being 415m north-west of the land required for the Proposed Scheme; and
- Packington Churchyard LWS covering an area of 0.5ha. The LWS has species-rich neutral grassland. The LWS is west of Packington and is located 210m south of the land required for the Proposed Scheme at its nearest point.

7.3.8 There are no ancient woodland inventory sites (AWIS) of potential relevance to the assessment in the Appleby Parva to Ashby-de-la-Zouch area.

7.3.9 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.

7.3.10 The National Forest is located within the Appleby Parva to Ashby-de-la-Zouch area. While this is not a designated site, it is a national initiative aiming to increase woodland cover to approximately one third of all land within its boundary, with new woodland linking ancient woodland, meadows, lakes, rivers and parks. There is a parcel of land within the land required for the Proposed Scheme which is part of an area set aside for future woodland planting within the National Forest.

[49] Leicestershire & Rutland County Council Species Records
[50] Park Farm Woodland LWS. Available online at: http://www.iucnredlist.org/about/overview
[51] Assigned conservation status of flora and fauna using the International Union for Conservation of Nature (IUCN) Red Data Book criteria and categories Available online at: http://www.iucnredlist.org/about/overview

Habitats

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

Woodland

7.3.12 In addition to the woodlands within designated sites described above, there are 13 other areas of deciduous broadleaved woodland (likely to qualify as habitats of principal importance[52], and local Biodiversity Action Plan[53] [BAP] habitats), which would be within or partly within the land required for the Proposed Scheme. These are listed below:

- two areas of woodland within the grounds of The Old Rectory east of junction 11 of the M42;
- a strip of woodland to the north of Burton Road;
- two areas of woodland either side of the A42 west of Measham;
- Parker's Wood west of the A42;
- two areas of Fiveways Wood east of the A42 and north west of The Oaks;
- unnamed woodland west of Beech House, north of Packington;
- two areas of woodland between the A42 and the land required for the Proposed Scheme west of Lounge Former Coal site; and
- two woodland areas south and north west of the A512 Ashby Road.
- All of these woodlands, with the exception of the unnamed woodland west of Beech House, are included within the National Forest area.
- On a precautionary basis, pending the findings of field surveys, these woodlands are considered to be of up to county/metropolitan value.

Grassland

7.3.13 Grasslands located outside of designated sites but within the land required for the Proposed Scheme and which may qualify as habitats of principal importance and local BAP habitat include an area of mesotrophic grassland adjacent (south) of the River Mease within a potential LWS and possible good quality semi-improved grassland north of Packington. On a precautionary basis, pending the findings of field surveys (which may identify these as unimproved grasslands), these grasslands are considered to be of up to county/metropolitan value. Other grasslands are considered to be of up to district/borough value.

[52] Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 - Habitats and Species of Principal Importance in England
[53] Leicestershire and Rutland Environmental Records Centre (2016) *Space for Wildlife: Leicester, Leicestershire and Rutland Biodiversity Action Plan 2016 – 2026*. Available online at: http://www.lrwt.org.uk/what-we-do/biodiversity-action-plan/

Hedgerows

7.3.14 Many of the hedgerows in the study area (including hedgerows within the land required for the Proposed Scheme) are likely to qualify as a habitat of principal importance and local BAP habitat. Some may also meet the wildlife and landscape criteria to be 'important' hedgerows as defined in the Hedgerows Regulations 1997[54]. In addition, they could also provide commuting corridors, nesting and feeding habitats for wildlife. On a precautionary basis, pending the findings of field surveys, the hedgerow network is considered to be of up to district/borough value.

Watercourses

7.3.15 Gilwiskaw Brook, tributary 1 and 2 of Coleorton Brook and five land drains would be crossed by the route of the Proposed Scheme. The section of Gilwiskaw Brook to be crossed on viaduct is outside, but upstream of, the River Mease SAC and SSSI and may qualify as a habitat of principal importance and local BAP habitat. On a precautionary basis, pending the findings of further field surveys and given its connectivity to the River Mease, the Gilwiskaw Brook outside of the River Mease SAC and SSSI is considered to be of up to county/metropolitan value. The smaller watercourses are considered to be of up to district/borough value, pending clarification through field surveys of their associated habitat context and water quality status.

Water bodies

7.3.16 There are 24 ponds that are located within the land required for the Proposed Scheme. Some may qualify as habitats of principal importance or local BAP 53 such as great crested newt). On a precautionary basis, pending the findings of field surveys, these ponds are considered to be of up to county/metropolitan value.

Ancient and veteran trees

7.3.17 Pending the results of the field surveys, it is possible that ancient and veteran trees are present within the land required for the Proposed Scheme. Information on ancient and veteran trees will be confirmed upon further survey and reported in the formal ES. On a precautionary basis and in the absence of survey information it is considered that ancient and veteran trees would be of district/borough value.

Protected and notable species

7.3.18 A summary of the likely value of faunal species of relevance to the assessment (excluding any features for which the sites described above are designated) is provided in Table 14.

Table 14: Species potentially relevant to the assessment within the Appleby Parva to Ashby-de-la-Zouch area

Resource/feature	Value	Rationale
Bats	Up to regional	There are over 100 records of bats in the Appleby Parva to Ashby-de-la-Zouch area. These include brown long-eared bat, noctule bat, common pipistrelle, soprano

[54] *"Statutory Instrument 1997 No. 1160"* Hedgerows Regulations 1997

Resource/feature	Value	Rationale
		pipistrelle, Daubenton's bat and serotine bat. There is suitable roosting and foraging habitat for bats throughout the Appleby Parva to Ashby-de-la-Zouch area. There is a record of a bat roost at Hall Farm in Packington, which is located 200m from the land required for the Proposed Scheme, and a pipistrelle roost at Nook Farm in Packington Nook, 40m north-west of the land required for the Proposed Scheme. The River Mease and Gilwiskaw Brook, as well as other watercourses, are likely to provide foraging and commuting habitat for bats. Woodland and hedgerows across the area are likely to provide foraging habitats and commuting routes for a range of bat species. Trees within these woodlands are likely to have features suitable for roosting bats.
Otter	County/metropolitan	Habitat suitable for otter is present along watercourses within the land required for the Proposed Scheme, including the River Mease. In addition, there are areas of otter terrestrial habitat including woodland, scrub and other dense vegetation associated with the watercourses. There are records of otter along the River Mease (within 500m of the land required for the Proposed Scheme (as well as the Gilwiskaw Brook and Ashby Canal. Otters are likely to use habitats within the land required for the Proposed Scheme.
Water vole	Up to county/metropolitan	Water vole are rare and continue to decline in Leicestershire. Records of water vole have been identified in Gilwiskaw Brook, within the land required for the Proposed Scheme. Another record of water vole has been identified 500m north-west of the land required for the Proposed Scheme, in Willesley Wood. Gilwiskaw Brook and the River Mease are considered to provide suitable habitat for this species. Pending further survey, it is considered likely that water vole would be present within the land required for the Proposed Scheme.
Polecat	Up to county/metropolitan	There is one record of polecat north of Coalville, 2km north-west of the land required for the Proposed Scheme. Habitat suitable for this species is present, including hedgerows, farmland and woodland.
Water shrew	Up to district/borough	Water shrew is included in the designation for the Ashby Canal SSSI, located 2.5km south-east of the land required for the Proposed Scheme and may be present within suitable habitats in the land required for the Proposed Scheme.

Resource/feature	Value	Rationale
Great crested newt	Up to county/metropolitan	There are positive environmental DNA (eDNA)[55] records for great crested newt in seven ponds from the ongoing surveys within the Appleby Parva to Ashby-de-la-Zouch area, including south of Appleby Magna, 217m from the land required for the Proposed Scheme. There are also records of great crested newt within the land required for the Proposed Scheme to both the south and north of the Former Lounge Coal Site, to the east of Ashby-de-la-Zouch. There are also records of great crested newt adjacent to the land required for the Proposed Scheme south east of Appleby Park Hotel and within 260m of the land required for the Proposed Scheme to the west of Appleby Magna, the nearest being 25m east of the land required for the Proposed Scheme south of Bowleys Lane.
Birds	Up to county/metropolitan	The farmland and woodland habitats within the Appleby Parva to Ashby-de-la-Zouch area are suitable for breeding and wintering birds. Schedule 1[56] species have been recorded within 500m of the land required for the Proposed Scheme and those with the potential to breed include barn owl (at Ashby-de-la-Zouch, Measham and Packington), little ringed plover (at Ashby-de-la-Zouch) and quail (at Appleby Magna). Wintering bird surveys in 2017/18 within 250m of the land required for the Proposed Scheme recorded a total of 41 species including 10 red-listed Birds of Conservation Concern (BoCC)[57] .
White-clawed crayfish	Up to county/metropolitan	White-clawed crayfish are scarce in Leicestershire and continue to decline. White-clawed crayfish are listed in the citations for the River Mease SAC/SSSI and Ashby Canal SSSI (2.5km south-east of the land required for the Proposed Scheme), and are currently assumed to be present within these watercourses and their tributaries.
Other aquatic invertebrates	Up to district/borough	Suitable habitat for aquatic invertebrates, including species of principal importance (other than white-clawed crayfish) is present in watercourses including the River Mease, Gilwiskaw Brook and smaller watercourses, and in standing water bodies.
Terrestrial invertebrates	Up to district/borough	Suitable habitat for terrestrial invertebrates is likely to occur in areas of woodland, scrub, hedgerows and grassland. There are records of white-letter hairstreak

[55] eDNA analysis is a method for species monitoring in water bodies. It is used as a method to determine the presence or absence of great crested newt in a water body.
[56] Schedule 1 of the Wildlife and Countryside Act 1981

Resource/feature	Value	Rationale
		and small heath butterflies within Willesley Wood, the eastern extent of which is immediately adjacent to the land required for the Proposed Scheme. Both are species of principal importance.
Fish	Up to county/metropolitan	Suitable habitat for fish is present in watercourses including the River Mease and Gilwiskaw Brook outside of the designated sites, as well as the smaller watercourses. There are records in the river catchments that would be affected by the Proposed Scheme, including records in the River Mease of bullhead and spined loach (Annex II species[58]), and European eel from 2014 and 2015. Bullhead and spined loach are listed in the citation for the River Mease SAC/SSSI, and their presence in Gilwiskaw Brook outside the designated site is also likely. The Mease and the Gilwiskaw Brook are both classified as salmonid rivers by the Environment Agency due to their suitability for brown trout.
Reptiles	Up to district/borough	There are records of grass snake within 500m of the land required for the Proposed Scheme. The closest record being 267m south east of the land required for the Proposed Scheme between Measham and Packington. There are records of common lizard at 2km from the land required from the Proposed Scheme. Pending further surveys, habitats that may support common species of reptiles, including grass snake and common lizard, are assumed to be present along the watercourses, as well as in other areas, such as grassland.

7.4 Effects arising during construction

Avoidance and mitigation measures

7.4.1 The following measures have been included as part of the design of the Proposed Scheme (in addition to the landscape planting shown on the Map Series CT-06 in the Volume 2: LA03 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:

- the River Mease viaduct would avoid direct impacts to the River Mease SSSI and SAC and, together with the Gilwiskaw Brook viaduct, would allow free passage for wildlife along these watercourses, including along the rivers and their banks;
- a section of Gilwiskaw Brook (outside the River Mease SSSI and SAC) would be realigned, resulting in the permanent loss of a 130m section of the existing watercourse. A similar length of meandering channel would be created to replace that which would be lost;

[58] Annex II of the EC Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (Habitats Directive)

- new woodland planting (72.4ha) located along much of the route, but specifically 5.66 ha of woodland habitat creation north of Measham adjacent to Fiveways Wood, would contribute towards compensation for the loss of woodland (e.g. Park Farm Woodland LWS, south-west of Packington and other woodland habitat), and enhance connectivity between remaining woodlands;
- provision of new ponds (e.g. south and north of Bowleys Lane, Appleby Magna, and ponds east of Ashby-de-la-Zouch), which would form part of the measures to address loss of water bodies and effects on great crested newt and other species;
- provision of 10.97 km of new species-rich hedgerows, using appropriate native species, to contribute towards compensating for the loss of hedgerows and re-connecting the ecological network in the surrounding areas, including along the margins of the route; and
- provision of 36.07 ha of new grassland habitats including species-rich grasslands to contribute towards compensating for losses as a result of the Proposed Scheme, located west of Appleby Parva cutting, on the south side of the River Mease, and at Gilwiskaw Brook, south of the Strategic Rail Freight Terminal development site.

7.4.2 The assessment assumes implementation of the measures set out within the draft CoCP[59], which includes translocation of protected species where appropriate.

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

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

[59] Supporting document: Draft Code of Construction Practice

- 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 entirety of the Appleby Parva to Ashby-de-la-Zouch area lies within the River Mease Catchment[60].

7.4.6 A study to inform the Habitats Regulations Assessment (HRA)[61] was undertaken for the River Mease SAC during the Appraisal of Sustainability stage of the project development. This was undertaken in consultation with Natural England and the Environment Agency. The HRA screening report concluded that there was a potential significant effect on the SAC due to shading of the river caused by the viaduct. A draft Appropriate Assessment was then undertaken, which included a detailed study of shading impacts on the river habitats. This concluded there would be no adverse effects on the River Mease SAC arising from the construction or operation of the Proposed Scheme. HS2 Ltd will continue to consult with these bodies (and other relevant key stakeholders) as the design develops to ensure that the submitted design in the hybrid Bill and its construction comply with the Habitats Regulations 2017. Where required, further assessment will be undertaken and an appropriate design will be developed through an iterative process. Any studies to inform the required assessments will be completed and the outcomes agreed with Natural England prior to submission of the hybrid Bill.

7.4.7 Construction of the River Mease viaduct would avoid impacts to the watercourse and its banks so there would be no significant effect on the integrity of the River Mease SSSI. It is expected that the effects of shading on the SSSI due to the River Mease and Gilwiskaw Brook viaducts would not be significant. Other temporary and indirect effects arising from construction of the Proposed Scheme, including realignment of the Gilwiskaw Brook upstream of the SSSI, would be controlled through measures set out in the draft CoCP. It is expected that implementation of measures in the draft CoCP would reduce the magnitude of these impacts to a level where there would be no significant adverse effects on the integrity of the SSSI.

7.4.8 Construction of the Willesley Wood Side cutting would result in the permanent loss of 0.5ha (100%) of the Park Farm Woodland LWS. Habitat loss would result in a permanent adverse effect on site integrity that would be significant up to the county/metropolitan level.

[60] Environment Agency (2017) *Mease Rivers Operational Catchment*. Available online at: http://environment.data.gov.uk/catchment-planning/OperationalCatchment/3303.
[61] HS2 (2012) *HRA Screening Report for the River Mease SAC*

Habitats

Woodland

7.4.9 In addition to the effects described above for designated sites, construction would result in the loss of 14ha[62] of broadleaved woodland in the Appleby Parva to Ashby-de-la-Zouch area that may qualify as habitat of principal importance or BAP habitat. This includes as a result of the construction of Willesley Wood Side cutting, which would require the removal of parts of Fiveways Wood, and the realignment of the A42, which would require the removal of a section of Parker's Wood. Both woodlands are part of the National Forest. This is a permanent adverse effect that would be significant at up to the county/metropolitan level. The proposed planting of woodland (woodland habitat creation and landscape mitigation planting) would compensate for losses of existing woodland so that the residual effect (following establishment of new woodland) would be reduced to not significant. However, if the ongoing review identifies the presence of additional ancient woodland, the residual effect would be significant at up to the county/metropolitan level.

Grassland

7.4.10 Construction of the Proposed Scheme would result in the loss of 4ha of grassland outside of designated sites but within potential LWS, that may qualify as habitats of principal importance or BAP habitats, including an area of mesotrophic grassland adjacent (south) of the River Mease to the east of the A42 and an area of possible good quality semi-improved and wet grassland north of Packington. In the absence of field survey information, it has been assumed that this grassland lost outside designated areas is not unimproved, and without mitigation the loss would be significant at up to the county/metropolitan level. Loss of other grasslands would be significant at up to district/borough level. The Proposed Scheme design in the Appleby Parva to Ashby-de-la-Zouch area includes 36.07ha of grassland habitat creation to compensate for habitat loss and this is expected to result in no significant adverse effect on grassland. The full extent of these areas will be reported in the formal ES.

Hedgerows

7.4.11 The Proposed Scheme would cross hedgerows that are located throughout the Appleby Parva to Ashby-de-la-Zouch area, some of which may be 'important' hedgerows[63]. The land required for the Proposed Scheme would result in the permanent loss of 24kmof hedgerows, and would result in severance of the network in many places, adversely affecting connectivity with the surrounding area. The Proposed Scheme includes 10.97km of new hedgerow planting, which would help compensate for 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.

[62] Calculated using Natural England Priority Habitats Inventory.
[63] The Hedgerow Regulations 1997

Watercourses

7.4.12 The Proposed Scheme would cross the River Mease and Gilwiskaw Brook on viaducts. The crossing of the River Mease SSSI has been assessed above. Gilwiskaw Brook would be crossed upstream of the River Mease SSSI and SAC and 130m would be lost due to realignment, although this loss would be compensated for through like-for-like replacement so that, following establishment of the replacement habitats, there would be no significant adverse effects on this watercourse.

7.4.13 The Proposed Scheme would result in the loss of sections of other smaller watercourses and severance of these minor watercourse or ditch corridors due to culverts, which would result in a permanent adverse effect that would be significant at up to the district/borough level.

Water bodies

7.4.14 Twenty four ponds would be lost as a result of the Proposed Scheme in the Appleby Parva to Ashby-de-la-Zouch area. The loss of ponds would result in an impact that would be significant at up to county/metropolitan level, particularly if it is confirmed that they support protected species or other species of importance. The Proposed Scheme design in the Appleby Parva to Ashby-de-la-Zouch area includes areas of habitat creation comprising a network of ponds with associated terrestrial habitat located south of Georgina's Wood, north of Sweethill Cottage that, following establishment, is expected to result in no significant adverse effect on water bodies. The full extent of these areas will be reported in the formal ES.

Ancient and veteran trees

7.4.15 It is assumed that if any ancient and veteran trees are within the land required for the Proposed Scheme in the Appleby Parva to Ashby-de-la-Zouch area, they would be permanently lost. Ancient and veteran trees are an irreplaceable resource and their potential loss would result in a permanent adverse effect that would be significant up to district/borough level in each case.

Species

Bats

7.4.16 The permanent removal or disturbance of habitat features that are utilised by bats during breeding, hibernation or migrating between roosts may result in adverse impacts on bat populations and assemblages. Habitat loss would reduce the availability of foraging resource and potentially result in the loss of roosts and fragmentation of commuting routes.

7.4.17 In particular, the construction of Willesley Wood Side cutting would cause the loss of parts of Parker's Wood and would sever Fiveways Wood. The Leicester to Burton upon Trent Line to the north of Leicester Road in Ashby-de-la-Zouch, which would be crossed by the Leicester to Burton upon Trent Railway overbridge, is likely to provide good commuting and foraging habitat. The railway is lined by mature trees, connects to hedgerows and woodlands that are within and outside the land required for the Proposed Scheme. The construction of the Ashby-de-la-Zouch cutting No. 1 approaching the Leicester to Burton upon Trent Line Railway overbridge would result

in the loss of habitat connecting to this linear feature. Bats may also be affected by the lighting associated with construction works, although it is anticipated that this would be controlled through measures described in the draft CoCP.

7.4.18 The proposed woodland, grassland and hedgerow planting will help to reduce impacts to bats and further mitigation will be identified following ongoing surveys and assessment. On a precautionary basis, in the absence of further survey information, it is considered that impacts would result in a permanent adverse effect on the conservation status of bat populations that would be significant at up to the regional level.

Otter

7.4.19 The viaducts over the River Mease and Gilwiskaw Brook would maintain habitats and allow passage for otter along the watercourse corridors. While there is potential for otter to be disturbed and displaced by construction activities, it is likely that significant effects would be avoided through measures in the draft CoCP. Loss of suitable habitat for otter would occur at the tributaries 1 and 2 of Coleorton Brook, which would be crossed by the Proposed Scheme. On a precautionary basis, in the absence of further survey information, it is considered that impacts to otter would result in an adverse effect on the conservation status of this species that would be significant at the county/metropolitan level.

Water vole

7.4.20 Water vole has been recorded in the Gilwiskaw Brook, within the land required for the Proposed Scheme. Gilwiskaw Brook and the River Mease are considered to provide suitable habitat for this species and the viaducts over the River Mease and Gilwiskaw Brook would avoid loss of habitat along the watercourse corridors. While there is potential for water vole to be disturbed and displaced by construction activities, it is likely that significant effects would be avoided through measures in the draft CoCP. Habitat loss would occur at the tributaries 1 and 2 of the Coleorton Brook, which would be crossed by the Proposed Scheme. On a precautionary basis, in the absence of survey information, it is considered that impacts to water vole would result in an adverse effect on the conservation status of this species that would be significant at up to the county/metropolitan level.

Polecat

7.4.21 The loss of habitats such as woodland, grassland and arable land could also affect polecat, a species that has been recorded north of Coalville, 2km north-west of the land required for the Proposed Scheme. On a precautionary basis in the absence of survey information, it is considered that the effects of permanent habitat loss on this species would be significant at up to the county/metropolitan level.

Water shrew

7.4.22 Water shrew is listed on the Ashby Canal SSSI citation, located 2.5km south-east of the land required for the Proposed Scheme. Suitable habitat is likely to be present for water shrew within the land required for the Proposed Scheme. On a precautionary basis, in the absence of survey information, it is considered that construction of the

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

Great crested newt

7.4.23 In the absence of survey results, it has been assumed that all 25 ponds and surrounding suitable terrestrial habitat within the land required for the Proposed Scheme may support great crested newt, and would be lost during construction. The assessment of ponds and whether they support great crested newt will be reported in the formal ES.

7.4.24 The loss of ponds supporting great crested newt and associated terrestrial habitat could result in the isolation and severance of breeding populations of great crested newt across this area. Where great crested newt is present, two new ponds would be created for every one lost to the permanent works, and this would contribute towards reducing the effects to 'not significant'. This also applies to any pond with great crested newt lost outside the area required for permanent works but within the land required for the Proposed Scheme. Suitable terrestrial habitat would be required around all new ponds created, along with links to encourage dispersal (e.g. by incorporating existing habitat or creating new habitat), and this would require further development. Habitat creation within the Proposed Scheme design includes areas together with associated terrestrial habitat have been included within the land required for the Proposed Scheme. On a precautionary basis, pending further surveys and information on construction phasing, it is considered that the loss of the ponds and surrounding land would result in a permanent adverse effect on the conservation status of great crested newt that would be significant at up to the county/metropolitan level.

Birds

7.4.25 The Proposed Scheme would result in the loss of nesting and foraging habitat for a range of breeding and wintering birds, predominantly farmland and woodland species. These are likely to include barn owl, a Schedule 1 species for which there are recent records at Ashby-de-la-Zouch, Measham and Packington within 500m of land required for the Proposed Scheme. On a precautionary basis, in the absence of further survey information, it is considered that the Proposed Scheme would result in a permanent adverse effect on birds that would be significant at up to the county/metropolitan level.

White-clawed crayfish

7.4.26 White-clawed crayfish is listed in the citation for the River Mease SAC/SSSI and there is the potential for this species to occur in the River Mease and Gilwiskaw Brook, and their tributaries. Pending the results of field surveys, it is unlikely that white-clawed crayfish occur in the minor watercourses and ditches to be culverted beneath the Proposed Scheme due to slow, sporadic flow and lack of suitable refuge for this species. Due to the inclusion of viaducts in the design there would be no effect on populations in the River Mease. However, in the absence of survey information, there is the potential for permanent adverse effects in the minor watercourses that would be significant at up to county/metropolitan level.

Aquatic invertebrates

7.4.27 The land required for the Proposed Scheme would result in loss of habitat suitable for aquatic invertebrates (including species of principal importance[64]), including within Gilwiskaw Brook and the two minor watercourses that would be crossed, and also within standing water bodies to be lost. On a precautionary basis, in the absence of survey information, it is considered that the Proposed Scheme would result in a permanent adverse effect that would be significant up to the district/borough level.

Terrestrial invertebrates

7.4.28 White-letter hairstreak and small heath butterfly (both species of principal importance) are recorded as present in Willesley Wood, the eastern extent of which is adjacent to the land required for the Proposed Scheme. In the absence of survey information, there is the potential for permanent adverse effects due to loss of habitat that would be significant at up to district/borough level.

Fish

7.4.29 There are records of fish from the main watercourses including species such as bullhead, spined loach and European eel. The Proposed Scheme would pass over these watercourses on viaducts, and indirect effects to the watercourses would be controlled through measures set out in the draft CoCP. Gilwiskaw Brook would be realigned and tributary 2 of Coleorton Brook culverted, and may require assessment under the WFD as part of the wider WFD compliance assessment. On a precautionary basis, in the absence of survey information, it is considered that the Proposed Scheme would result in permanent adverse effects on the minor watercourses or ditches within the land required for the Proposed Scheme, which would be significant at up to county/metropolitan level.

Reptiles

7.4.30 There are records of common reptiles (grass snake) within 2km of the land required for the Proposed Scheme. Suitable habitat for reptiles is likely to be present within the land required for the Proposed Scheme, including grassland, scrub, hedgerows and field margins. On a precautionary basis in the absence of survey information, it is considered that the construction of the Proposed Scheme would result in permanent adverse effects that would be significant at up to the district/borough level.

7.4.31 Effects on other habitats and species up to local/parish level will be reported in the Final ES.

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

[64] Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 - Habitats and Species of Principal Importance in England

Other mitigation measures

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

- provision of additional broadleaved woodland to replace (non-ancient) woodland habitat lost, and/or enhancement of remaining woodlands;
- options to modify construction areas locally to reduce direct impacts to local wildlife sites, other sites and priority habitats;
- provision of additional hedgerows, which would mitigate the losses and maintain the connectivity of the network;
- options to create new species-rich grasslands (including translocation where appropriate) to mitigate grassland losses including north of Packington;
- considering the need for inclusion of structures to reduce severance effects on bats;
- provision of additional measures to facilitate connectivity where significant foraging or commuting routes of fauna species would be affected;
- use of temporary fencing or retention of existing habitat links to reduce the risk of disturbance to otters during construction; design of watercourse culverts and underpasses to allow the free passage of wildlife;
- provision of alternative roosting habitat for bats; and
- provision of additional ponds where necessary (on a two to one basis where existing ponds supporting great created newts are lost), outside the area required for the permanent works but within the land required for construction of the Proposed Scheme, and suitable terrestrial habitat around these ponds with habitat links to allow dispersal.

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

Summary of likely residual significant effects

7.4.35 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 15.

Table 15: Residual significant effects on ecological resources/features during construction

Resource/feature	**Residual effect**	**Level at which the effect would be significant**
Park Farm Woodland LWS	Permanent adverse effect on site integrity due to loss of entire LWS woodland site.	Up to county/metropolitan
Woodland	Loss of existing woodland. New woodland creation included in scheme design, Potential adverse effect on ancient woodlands.	Up to county/metropolitan level.
Hedgerows	Permanent loss of 24km of hedgerows and fragmentation of hedgerow network.	Up to district/borough
Watercourses	Permanent adverse effect from loss and fragmentation of minor watercourses.	Up to district/borough
Ancient and veteran trees	Permanent adverse effect from potential loss of ancient and veteran trees.	Up to district/borough (in each case)
Bats	Potential permanent adverse effect on conservation status due to loss of roosts, foraging habitat and fragmentation.	Up to regional
Otter	Potential permanent adverse effect on conservation status due to loss and fragmentation of habitat along watercourses.	County/metropolitan
Water vole	Potential adverse effect on conservation status due to loss and fragmentation of habitat along watercourses.	Up to county/metropolitan
Polecat	Potential permanent adverse effect on conservation status due to loss of habitat.	Up to county/metropolitan
Water shrew	Potential permanent adverse effect on conservation status due to loss of habitat.	Up to district/borough
Great crested newt	Loss of 25 ponds and surrounding terrestrial habitat that may support great crested newt. Potential permanent adverse effect on conservation status due to loss of habitat.	Up to county/metropolitan
Birds	Potential permanent adverse effect on conservation status due to loss, fragmentation and/or severance of habitat for nesting and feeding.	Up to county/metropolitan
White-clawed crayfish	Potential permanent adverse effect on conservation status due to loss of habitat and severance.	Up to county/metropolitan
Aquatic invertebrates	Potential permanent adverse effect on conservation status due to loss of habitat.	Up to district/borough
Terrestrial invertebrates	Potential permanent adverse effect on conservation status due to loss of habitat.	Up to district/borough
Fish	Potential permanent adverse effect on conservation status due to loss of habitat	Up to county/metropolitan

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

Other mitigation measures

7.5.5 Additional mitigation measures currently being considered include:

- updating the HS2 barn owl mitigation plan[65] which has been developed to provide measures that will be implemented to reduce the effects of the Proposed Scheme to a level that is not significant. This is likely to include seeking opportunities to provide barn owl nest boxes and where feasible habitat enforcement opportunities at least 3km from the Proposed Scheme in consultation with landowners; and
- structures to reduce mortality to bats.

[65] Currently in development for Phase One of HS2

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 16.

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

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

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 Appleby Parva to Ashby-de-la-Zouch area.

8 Health

8.1 Introduction

8.1.1 This section identifies the communities within the Appleby Parva to Ashby-de-la-Zouch area that would be subject to impacts associated with the Proposed Scheme and describes the changes that are considered to be potentially important for the health and wellbeing of people within these communities, where these effects are considered to be consequential.

8.1.2 Engagement with key public health bodies is underway, including with Public Health England (PHE), Directors of Public Health and Health and Wellbeing Boards. The purpose of the engagement has been to increase the understanding of health issues that may not be identified solely through a review of publicly available data. Engagement with key public health bodies will continue as part of the development of the Proposed Scheme.

8.1.3 This section deals specifically with impacts and effects at a local level within the Appleby Parva to Ashby-de-la-Zouch 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: LA03 Map Book.

8.2 Scope, assumptions and limitations

8.2.1 The scope, assumptions and limitations for the health assessment are set out in Volume 1 and the Scoping Methodology Report (SMR)[66].

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 wellbeing 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 Appleby Parva and Ashby-de-la-Zouch area are:

- for impacts during construction (temporary and permanent):

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

  - neighbourhood quality;
  - access to services, health and social care;
  - access to green space, recreation and physical activity; and
  - social capital[67].
- for impacts during operation (permanent):
  - neighbourhood quality

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

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

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

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

8.3 Environmental baseline

Existing baseline

Description of communities in the Appleby Parva to Ashby-de-la-Zouch area

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

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

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

8.3.2 The route of the Proposed Scheme would run through mainly rural areas, comprising agricultural land interspersed with woodland, villages, and a number of isolated dwellings and farmsteads. The route of the Proposed Scheme would pass close to the settlements of Appleby Magna, Measham, Oakthorpe, Packington, and Ashby-de-la-Zouch.

Appleby Magna and surrounds

8.3.3 The village of Appleby Magna is located to the east of the route of the Proposed Scheme. The hamlet of Appleby Parva adjoins Appleby Magna to the south, connected by New Road and Church Street. Together, Appleby Magna and Appleby Parva comprise approximately 500 residential properties, the nearest of which are located within land required for the Proposed Scheme.

8.3.4 Community resources within Appleby Magna include places of worship (St. Michael and All Angels' Church), two public houses (The Black Horse and Crown Inn), Appleby Magna Cricket Club, education facilities (Happy Hedgehogs Pre-school) and areas of open space and recreational facilities (including a play area and an allotment garden situated on Rectory Lane, which is used by members of Appleby Magna Allotment Society).

8.3.5 Within Appleby Parva, community resources include a hotel and restaurant (Appleby Inn Hotel and Restaurant) and an educational facility (Sir John Moore Church of England Primary School).

Measham and surrounds

8.3.6 The village of Measham comprises approximately 2,300 residential properties, the nearest of which would lie adjacent to the route of the Proposed Scheme. Measham is located approximately 3km north-east of Appleby Magna, connected by Rectory Lane/Measham Road and Tamworth Road.

8.3.7 Community resources within Measham include a variety of shops, public houses (The White Hart and Bird in Hand), restaurants, medical facilities (Measham Dental Practice, Measham Medical Centre and Measham Opticians), educational facilities (St. Charles Catholic Primary School, Measham Church of England School and Surestart Family Centre), places of worship (Measham Methodist Church, Measham Baptist Church and St. Laurence Church of England Church) and Measham Leisure Centre. Other facilities include publicly accessible woodlands and parks, including Willesley Wood and Fiveways Wood.

Oakthorpe and surrounds

8.3.8 Oakthorpe is a village comprising approximately 1,200 residential properties, the nearest of which lies approximately 100m north-west of the route of the Proposed Scheme. Measham and Oakthorpe are connected by New Street, which crosses the A42.

8.3.9 Community resources in Oakthorpe include educational facilities (Oakthorpe Primary School, Little Oak Pre-school), public houses (Holly Bush Inn and Shoulder of Mutton) and the Oakthorpe Community Leisure Centre, which provides meeting spaces and a hireable multi-use games area used by Oakthorpe Athletic Football Club.

Packington and surrounds

8.3.10 Packington is a village comprising approximately 350 residential properties, the nearest of which is located approximately 50m south-east of the route of the Proposed Scheme.

8.3.11 There are a number of community facilities in Packington including educational facilities (Packington Church of England Primary School and Packington Play Group) and places of worship (Bethany Ministries Church and the Church of the Holy Rood) and community space in Packington Memorial Hall.

Ashby-de-la-Zouch and surrounds

8.3.12 Ashby-de-la-Zouch is a town comprising approximately 6,000 residential properties, located approximately 50m north-west of the route of the Proposed Scheme. It is bounded to the west by areas of agricultural land and the National Forest.

8.3.13 Ashby-de-la-Zouch provides a wide range of community resources including numerous restaurants and shops, public houses, a supermarket, health care facilities, education facilities (Ashby Willesley Primary School and Manor House School), places of worship (St. Thomas' Church, Ashby Evangelical Church and St. Helen's Church) and community facilities (Ashby-de-la-Zouch Community Centre). Other facilities include sports and recreational facilities (tennis courts, a cricket club, Willesley Park Golf Course and Ashby Ivanhoe Football Club) open spaces (Beech Wood, Roefield Wood, Normandy Wood, Sunnyside Wood, Western Park) and play areas (Ashby Depot Playing Fields and a number of equipped play areas).

Demographic and health profile of the Appleby Parva to Ashby-de-la-Zouch area

8.3.14 The local communities potentially affected by the Proposed Scheme in the Appleby Parva to Ashby-de-la-Zouch area have a relatively low population density, commensurate with the predominantly rural nature of the area.

8.3.15 Data provided by the Office of National Statistics[68] show that this population has a better health status overall compared with the national (England) averages.

8.3.16 The population is less deprived than the national average with regard to the combined indices of multiple deprivation[69], and the health domain (a sub-set of the indices of multiple deprivation). The area as a whole is considered to be more resilient than the national average with regard to changes in relevant health determinants, and with few vulnerabilities in terms of the health status of the population.

[68] The Office of National Statistics (ONS) provides spatial data on levels of deprivation, using indicators of: 'multiple deprivation', 'employment', 'education', 'barriers to housing and social services', 'crime' and 'living environment'. These data are available by Lower Super Output area.
[69] 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

8.3.17 The available data provide detail down to ward level and enable a profile to be made of the whole population in the Appleby Parva to Ashby-de-la-Zouch area. The description of the whole population, and the populations within wards, 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 impacts. Examples of the mitigation measures incorporated into the design of the Proposed Scheme include the following:

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

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

8.4.3 HS2 Ltd would require its contractors to comply with the environmental management regime for the Proposed Scheme, which would include the measures set out in the draft Code of Construction Practice (CoCP)[70], which provides a general basis for route-wide construction environmental management. Contractors would also be required to comply with the measures in Local Environmental Management Plans (LEMP), which apply the environmental management strategies at a local level.

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

8.4.5 The CoCP will require the nominated undertaker and its contractors to: produce and implement a community engagement framework and provide appropriately experienced community relations personnel to implement the framework; provide appropriate information; and to be the first point of contact to resolve community issues. The nominated undertaker would be required to take reasonable steps to engage with the community, focusing on those who may be affected by construction

[70] Supporting document: Draft Code of Construction Practice

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

8.4.9 In contrast, a qualitative approach is taken to assessing impacts on neighbourhood quality. The assessment looks at changes in character, tranquillity and amenity across the neighbourhood as a whole, including streets and other public and private outdoor areas. This is judged on a case-by-case basis, taking into account the characteristics of each neighbourhood. It will be informed by the findings from other assessments, but does not rely on the same significance thresholds, as it is not focused on individual receptors. The assessment of health and wellbeing effects considers issues such as people's feelings of attachment to, and pride in, their neighbourhood and enjoyment of outside space, and how these may change.

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

8.4.11 Dust emissions from construction activities are considered in Section 5, Air quality, which identifies no adverse effects with respect to the effects of construction activities on dust soiling and human health within the Appleby Parva to Ashby-de-la-Zouch 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 permanent[71] impacts on neighbourhood quality in areas close to construction sites, including residential areas at Appleby Parva, Appleby Magna, Measham, Oakthorpe, Packington and Ashby-de-la-Zouch. Impacts on neighbourhood quality have the potential to affect the wellbeing of residents adversely during the construction phase, by giving rise to negative feelings in relation to quality of life and the local environment, and potentially changing behaviours, such as deterring the use of outdoor space.

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

8.4.14 Traffic and transport impacts in the Appleby to Parva Ashby-de-la-Zouch area may include:

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

8.4.15 Construction traffic, including HGVs, may be present on a number of roads in the area, as listed 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 Settlements in the Appleby Parva to Ashby-de-la-Zouch area include the urbanised town of Ashby-de-la-Zouch and the rural villages of Appleby Magna, Appleby Parva, No Man's Heath, Measham, Oakthorpe and Packington. Construction activities and permanent structures would be visible from a number of locations, due to the scale of the Proposed Scheme. Section 11, Landscape and visual, identifies locations that may

[71] 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.

experience changes to existing views, including country roads, PRoW and views from properties close to the Proposed Scheme. Effects on views of the rural landscape may have negative impacts on residents' perceptions of the quality and character of their local environment, leading to a reduction in wellbeing.

8.4.18 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

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

8.4.20 The Appleby Parva to Ashby-de-la-Zouch area is predominantly rural in character. Typically, there is a reliance on shops and services in nearby towns and villages. Opportunities to access alternative services and facilities are limited, resulting in the necessity to travel longer distances to access alternative facilities. There is potential for communities to experience increased difficulty in accessing shops and community services (such as post offices, banks, libraries) as a result of increased journey times during construction. This will be assessed and reported in the formal ES.

Access to green space, recreation and physical activity

8.4.21 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.

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

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

8.4.23 The route of the Proposed Scheme would cross a number of PRoW in the Appleby Parva to Ashby-de-la-Zouch area. The effects on amenity and recreational value of these PRoW networks, and therefore, levels of physical activity and associated health and wellbeing benefits, will be reported 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 HGVs, would be present on a number of roads in this area, as outlined in Section 14, Traffic and transport. This

could obstruct or deter pedestrians, cyclists and equestrians from using these routes. In the case of recreational users, it is considered that alternative routes are likely to be available in most cases, and therefore that impacts on the affected roads would not reduce overall levels of recreational non-motorised users (NMUs). For those using affected routes for active travel to work or to access shops and services, there is the possibility that people would choose instead to travel by car, temporarily reducing levels of physical activity and associated health and wellbeing benefits.

8.4.25 Land required for the diversion of Rectory Lane would result in the temporary loss of both vehicular and pedestrian access points to the Rectory Lane allotment gardens, used by Appleby Magna Allotment Society for a period of approximately one year and six months, and the permanent loss of approximately 5% of the allotment gardens. The allotments make a positive contribution to the local community through the provision of green space and opportunities for physical activity and growing healthy food. There are alternative allotments located in Measham, but there is currently a waiting list for plots. As such, assuming that the availability of alternative allotments in the district is limited, the temporary loss of the entire allotments during construction and the permanent loss of approximately 5% of the allotments would have an adverse effect on health and wellbeing.

8.4.26 The construction of the Measham embankment No.2 and the Willesley Wood Side cutting would result in the temporary loss of approximately 70% of Fiveways Wood for a period of approximately three years, and permanent loss of approximately 20% of Fiveways Wood. Approximately 100m to the north of Fiveways Wood lies Willesley Wood, which would not be directly affected by the Proposed Scheme but which is easily accessed from Fiveways Wood, via a network of connecting paths, and via Measham Road and Ashby Road from Measham. Fiveways Wood makes a positive contribution to the local community through the provision of an area for physical activity, informal recreation and access to green space. While Willesley Wood provides an easily accessible and comparable alternative, the ability for users to undertake recreational activities within Fiveways Wood would remain compromised. As such, the temporary loss of 70% of the wood and permanent loss of 20% of the wood would have an adverse effect on health and wellbeing.

Social capital

8.4.27 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:

8.4.28 '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'[72].

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

8.4.30 Settlements in the Appleby Parva to Ashby-de-la-Zouch area support well-established communities. The size of the temporary construction workforce may be substantial relative to the size of these local communities. During the day, the workforce would be present on construction sites and compounds throughout the area, including satellite compounds near the settlements of Appleby Parva, Appleby Magna, Measham, Oakthorpe, Packington and Ashby-de-la-Zouch. The duration of the works at each site would range from approximately one to four years. The presence of construction workers is likely to be noticeable, with construction vehicles using local roads to access compounds and workers using facilities such as shops, restaurants and public houses within local villages, particularly Appleby Magna, Measham and Packington.

8.4.31 The introduction of a temporary construction workforce into communities has 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.

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

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

8.4.34 The health assessment considers changes to the social environment and loss of social networks experienced by the remaining community following the loss of residential properties. For this to have an adverse impact on overall levels of social capital, the loss of homes would need to make up a sizeable proportion of the local community,

[72] Office for National Statistics- Measuring Social Capital. Available online at: http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/dcp171766_371693.pdf

with the potential to result in the direct loss of contacts in the local area and/or a noticeable reduction in the number of people using local facilities. This will be judged on a case-by-case basis, taking account of the size of the community and its characteristics. Therefore, not all of the significant effects identified in the Community section will result in adverse health and wellbeing effects.

8.4.35 It is currently anticipated that four residential properties would be demolished as a result of the construction of the Rectory Lane diversion and Appleby Magna cutting in Appleby Magna. However, the demolition of these properties would not constitute an erosion of social networks and impact on resident's health and wellbeing, and no health effects are anticipated on the remaining community.

8.4.36 The New Street realignment would require the demolition of one residential property, southeast of Oakthorpe. However, the demolition of this property would not constitute an erosion of social networks and impact on resident's health and wellbeing, and no health effects are anticipated on the remaining community.

8.4.37 It is currently anticipated that 27 properties in Measham would be demolished as a result of the construction of the A42 Measham cutting. The erosion of social networks resulting from these demolitions would have the potential to reduce social capital, reducing the beneficial health effects that are gained through social contact and support for the remaining community.

8.4.38 In the Appleby Parva to Ashby-de-la-Zouch area, there is a potential for effects on the social environment to occur at Willesley Wood to the south-west of Packington. It is currently expected that eight residential properties would be demolished as a result of the construction of the Willesley Wood Side cutting. The erosion of social networks resulting from these demolitions would have the potential to reduce social capital, reducing the beneficial health effects that are gained through social contact and support for the remaining community.

8.4.39 It is currently expected that Ashby-de-la-Zouch cutting No.1 would require the demolition of one residential property on Leicester Road in Ashby-de-la-Zouch. However, the demolition of this property would not constitute an erosion of social networks and impact on resident's health and wellbeing, and no health effects are anticipated on the remaining community.

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

8.4.41 Road closures and diversions required for the construction of the Proposed Scheme would have the potential to reduce community connectivity by increasing journey times between rural communities. Potential health and well-being effects will be reported in the formal ES.

Other mitigation measures

8.4.42 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.

8.4.43 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.

8.4.44 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 Appleby Parva to Ashby-de-la-Zouch area will be reported in the formal ES.

Assessment of impacts and effects

Neighbourhood quality

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

Other mitigation measures

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

Monitoring

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

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

9 Historic environment

9.1 Introduction

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

9.1.2 Engagement has been undertaken with Historic England and Leicestershire County Council (LeCC). 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: LA03 Map Book. Only designated heritage assets within the Appleby Parva to Ashby-de-la-Zouch area are shown on maps CT-10-355b to CT-10-359a. Non-designated heritage assets have also been assessed as part of this work, although they are not illustrated on these maps.

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

9.1.5 Assets have been identified in this section of the report using their National Heritage List for England (NHLE) or Historic Environment Record (HER) name and number (numbers prefixed MLE). 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)[73], 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

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

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

9.2.3 The study area within which a detailed assessment of all assets, designated and non-designated, has been carried out is defined as the land required for the Proposed Scheme plus 250m in urban areas and 500m in rural areas. This is referred to in the remainder of this assessment as the 250m, or 500m study area.

9.2.4 The setting of all designated heritage assets within a study are 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, the exception to this is the Grade II listed building Meer Bridge (NHLE 1361269), which although within the land required for the construction of the Proposed Scheme, would not be physically impacted. In addition, although the following assets are within the land required for the construction of the Proposed Scheme and may be affected, any effect is unlikely to be significant:

- Salt Street (MLE4251);
- Tamworth to Sawley Roman road (MLE20490);
- Via Devana Roman road (MLE4345);
- Ashby and Nuneaton Joint Railway (MLE16051);
- Ashby Canal (MLE8916);
- Turnpike road Donisthorpe to Measham (MLE21281);
- Turnpike road, Leicester to Ashby-de-la-Zouch (MLE20653);
- Midland Railway, Leicester and Burton Branch Line (MLE16077) of the Leicester to Burton upon Trent Line; and
- Turnpike road, Loughborough to Ashby-de-la-Zouch (MLE20911).

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

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

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

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

9.3 Environmental baseline

Existing baseline

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

- the NHLE (Historic England register of designated heritage asset);
- Leicestershire and Rutland HER;
- conservation area appraisals; and
- historic maps and aerial photography.

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

Designated assets

9.3.3 The following designated heritage assets are located partially or wholly within the land required for the Proposed Scheme:

- The Old Rectory Grade II listed building (NHLE 10747330), of moderate value;
- The Coach House and Stables at the Old Rectory Grade II listed building (NHLE 1361264), of moderate value;
- Meer Bridge Grade II listed building (NHLE 1361269), of moderate value; and
- 4 and 5 Park Farm Grade II listed building (NHLE 1361589), of moderate value.

9.3.4 The following designated heritage assets (listed from south to north) are located partially or wholly within the 2km study area:

- three scheduled monuments comprising the Moated site, fishponds, formal garden and settlement earthworks east of St. Michael's Church, Appleby Magna (NHLE 1011458, part of Appleby Magna Conservation Area), Ashby Castle and associated formal garden (NHLE 1013324), and Coal mining remains at The Conery, 500m south of Coleorton Hall (NHLE 1018464), all of high value;
- three Grade I listed buildings, including the Sir John Moore Church of England School (NHLE 1177850), and two buildings within the Ashby-de-la-Zouch Conservation Area, the parish church of St. Helen, Ashby-de-la-Zouch (NHLE 1188344) and Castle Ruins (NHLE 1073591) included within the Ashby Castle and associated formal garden scheduled monument (NHLE 1013324), all of high value;
- eleven Grade II* listed buildings, including two within Appleby Magna Conservation Area; one within Measham Conservation Area, one within Packington Conservation Area and six within Ashby-de-la-Zouch Conservation Area, all of high value;
- two hundred and one Grade II listed buildings, including 166 buildings within the conservation areas at Appleby Magna, Measham, Packington and Ashby-de-la-Zouch, three churches, 25 other domestic, rural, commercial or industrial buildings, and eight farmhouses including, for example, Side Hallows Farmhouse (NHLE 1074331), which are all of moderate value; and
- four conservation areas, comprising Appleby Magna, Measham, Packington and Ashby-de-la-Zouch, of moderate value.

Non-designated assets

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

- Salt Street (MLE4251);
- Roman site north-west of the Old Rectory (MLE8596);
- Tamworth to Sawley Roman road (MLE20490);
- possible cremation burials from east of Heath Lodge (MLE4256);
- prehistoric remains, Repton Road (MLE7663, MLE17135); and
- Via Devana Roman road (MLE4345).

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

- enclosure at No Man's Heath (MLE4252);
- Dingle Farm (on first edition OS map);
- Ashby and Nuneaton Joint Railway (MLE16051);
- Ashby Canal (MLE8916);

- Turnpike road Donisthorpe to Measham (MLE21281);
- Coal workings, Fields Farm (MLE4768);
- Willesley Park (MLE8491);
- Smoile Farm (on first edition OS map);
- possible cropmark south-east of Chapmans Meadows (MLE21107);
- Turnpike road, Leicester to Ashby-de-la-Zouch (MLE20653);
- Midland Railway, Leicester and Burton Branch Line (MLE16077), currently the Leicester to Burton upon Trent Line;
- Turnpike road, Loughborough to Ashby-de-la-Zouch (MLE20911);
- Cropmarks north-east of Flagstaff Farm (MLE4279); and
- Flagstaff Farm and associated outbuildings (on 1843 Coleorton Tithe Map).

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

- four assets of moderate value, including evidence for a Roman road, and archaeological earthworks and associated remains for medieval deserted medieval villages; and
- twenty two assets of low value, including predominately cropmarks of unknown date, remains of ridge and furrow, and the location of post-medieval mills.

Historic environment overview

9.3.8 There is limited evidence for early prehistoric activity within the study area. Neolithic flint scatters (MLE7663, MLE17135), evidencing prehistoric activity, were recovered from, the area east of Oakthorpe within 1km of the route of the Proposed Scheme. The River Mease valley has a concentration of possible prehistoric occupation activity; therefore, there is the potential for alluvium and waterlogged peat that may retain exceptionally well-preserved prehistoric archaeological and palaeo-environmental remains within the study area. On the northern side of the Mease valley Mesolithic, Neolithic and Bronze age worked flint, comprising both flint tools and waste flint flakes, has been recovered during excavations. To the south of the River Mease, on the Tarporley Siltstone Formation, is a network of cropmarks[74] that include pit alignments, rectangular enclosures and other ditches. Both indicate possible settlement. In the higher ground above the River Mease, possible cremation burials have been discovered to the north-west of Appleby Magna (MLE4256). This, along with the ring ditches, indicates that this landscape was inhabited from at least the Bronze Age. A large sub-oval enclosure discovered by aerial photography next to Salt

[74] Cropmark is a term used to describe features identified through differential growth patterns observed in crops or grasses. They indicate the presence of buried features and are normally identified from the air.

Street (MLE21107), has been interpreted as a potential Iron Age farmstead. However, there are no other known late prehistoric remains within the study area.

9.3.9 Salt Street (MLE4251) is the postulated course of a Roman routeway and there are a further three Roman routes, including the 'Via Devana' (MLE4345), Long Lane and a road between Tamworth and Sawley (MLE20490), that are within 500m of the route of the Proposed Scheme. Rural settlement activity is evidenced by a small Romano-British farmstead dated to the 4th century found during excavations for construction of Appleby Park Hotel (MLE8596). The recovery of quern stones and environmental remains provided evidence for agricultural processes including corn drying whilst evidence for insubstantial buildings was also identified.

9.3.10 There are no known physical remains of early medieval date within the study area although Appleby Magna (MLE5992), Measham (MLE9000), Packington (MLE10599) and Ashby-de-la-Zouch (MLE4295) are all included within the Domesday Survey of 1086 indicating that these settlements had been established by this date.

9.3.11 Within 500m of the route of the Proposed Scheme there is a moated site at Appleby Magna (NHLE 1011458). The majority of moated sites served as prestigious aristocratic residences with the provision of a moat intended as a status symbol rather than a practical military defence. The peak period during which moated sites were built was between about 1250 and 1350 and by far the greatest concentration lies in central and eastern parts of England. At Ashby-de-la-Zouch there is a 12th century medieval castle (NHLE 1013324), which was modified into a fortified dwelling with landscaped gardens during the 16th century. These settlements served as the main centres of activity during the medieval period with smaller nucleated[75] settlements at Appleby Parva, Oakthorpe, Measham and Packington.

9.3.12 Beyond the nucleated settlements, the post-medieval landscape is defined by isolated farmsteads and park land. Examples of isolated farmsteads include Flagstaff Farm, Dingle Farm and Smoile Farm. The 17th to 18th century designed landscape of Willesley Park (MLE8491) sits within this farmed landscape. The main house was served by its own Home Farm, on the southern edge of its landscaped grounds; now named Park Farm (NHLE1361589). The majority of the parkland has been remodelled as a golf course.

9.3.13 Parts of the route of the Proposed Scheme are recorded as being located on a bedrock geology comprising the Pennine Middle Coal Measures formation. The coal seams have long been exploited and evidence dating to the medieval period has been identified at Fields Farm (MLE4768). The coal measures around Measham were exploited during the 19th century as part of the Oakthorpe Colliery. The exploitation of this resource greatly expanded with the increase in demand during the post-medieval period coupled with the improvement of transportation links.

9.3.14 The variety of improved transportation links reflects the importance of the area during the post-medieval period in terms of extracting coal as well as the involvement of the

[75] A nucleated settlement is one where the majority of dwellings cluster around a central focal point, usually a church.

area in the brickmaking and pottery industries. Measham/Wilkes Gobs are a brick type specific to the area. They were developed by Joseph Wilkes, a local entrepreneur based in Measham, in an attempt to overcome brick tax. The tax was introduced in 1784 and was a property tax based on the number of bricks per property. To overcome the tax, brick manufacturers increased the size of their bricks to reduce the number of bricks required per property. These bricks survive in buildings throughout the area.

9.3.15 The transport links established include the Donisthorpe to Measham turnpike road (MLE21281), the Leicester to Ashby-de-la-Zouch turnpike road (MLE20911), the Loughborough to Ashby-de-la-Zouch (MLE20911), the Ashby Canal (MLE8916), the Leicester to Burton upon Trent Line (MLE16077), and the Ashby and Nuneaton Joint Railway (MLE16051) which all served the area during the Post-medieval and modern eras.

9.4 Effects arising during construction

Avoidance and mitigation measures

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

9.4.2 Section 8 of the draft Code of Construction Practice CoCP[76] sets out the measures that will be adopted, insofar as reasonably practicable, to control effects on heritage assets. These include:

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

Assessment of impacts and effects

Temporary effects

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

9.4.4 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.

[76] Supporting document: Draft Code of Construction Practice

9.4.5 Side Hallows Farmhouse (NHLE 1074331) is a Grade II listed building of moderate value, which abuts the southern boundary of land required for the construction of the Proposed Scheme. It comprises an 18th century, three-storey, brick farmhouse. The listed building derives its heritage value from its architectural interest, and its historic and evidential value as a well-preserved farmhouse. The setting of the farmhouse is defined by its position within the River Mease valley and the surrounding agricultural landscape. This setting positively contributes to the heritage value of the farmhouse by demonstrating its rural character. The spatial relationship between the farmhouse and its associated agricultural buildings also contributes positively to the setting of the listed building by demonstrating the functional relationship between farmhouse and ancillary buildings such as barns and equipment stores. These attributes all reinforce the agricultural character of the farmhouse. The setting of Side Hallows Farmhouse would be affected by construction activities associated with the construction of the River Mease viaduct, the presence of the River Mease viaduct south satellite compound and the movement of construction traffic, which would adversely affect views to and across the asset within its landscape setting. This would impact on the ability to fully appreciate the heritage value of the farmhouse. This would be a medium term effect, and constitutes a medium magnitude of impact and a moderate adverse effect.

9.4.6 Meer Bridge (NHLE 1361269) is a Grade II listed building of moderate value. It comprises a brick built bridge dating to the latter half of the 19th century, which was originally constructed over the Ashby Canal and the Leicester to Burton upon Trent Line, although only the span over the former railway line survives. The setting of the bridge is tightly defined and intrinsically linked to the former railway line and course of the canal, and Burton Road. The asset derives its significance from its architectural and historic interest as an industrial structure whose original function of crossing a railway line is still readily perceptible. The setting of the bridge is currently experienced by passing over or underneath the bridge and the key views towards the asset are along the footpath where the architectural and historic interest of the bridge is best experienced. The setting of Meer Bridge would be affected by construction activities associated with the construction of the River Mease viaduct, the presence of the River Mease viaduct north satellite compound and the movement of construction traffic. These activities would adversely affect views to and across the asset within its setting and the temporary closure of the footpath would impact on the ability to fully appreciate the heritage value of the asset. This would be a medium term effect, and constitutes a medium magnitude of impact and a moderate adverse effect.

9.4.7 Packington Conservation Area is of moderate heritage value and abuts the land required for the construction of the Proposed Scheme. The village is compact and largely contained within a circuit of four roads and with Gilwiskaw Brook flowing along the western edge of the village. The brook is key to the spatial development of the settlement. The key characteristics that contribute towards the special character and appearance of the conservation area include the architectural and historic quality of the listed and non-designated historic buildings, use of local vernacular materials, boundary treatment and green spaces, which contribute to the rural character of the historic settlement. The setting of the conservation area contributes positively to its heritage value, and is defined by the surrounding undulating agricultural fields. The

setting of the conservation area would be affected by construction activities associated with Gilwiskaw viaduct, Vicarage Lane overbridge, excavation of balancing ponds to the west of the conservation area and the presence of Gilwiskaw Brook viaduct satellite compound and Vicarage Lane overbridge satellite compound. The movement of construction traffic would adversely affect the agricultural land that contributes to the heritage value of the conservation area. This would be a medium term effect and constitutes a medium magnitude of impact and a moderate adverse effect.

Permanent effects

9.4.8 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.

9.4.9 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.

9.4.10 The Grade II listed buildings of The Old Rectory (NHLE 1074330) and the Coach House and Stables at the Old Rectory (NHLE 1361264) are of moderate value. These listed buildings are situated within the land required for the construction and operation of the Proposed Scheme, and would be demolished for the construction of the Appleby Magna cutting. The listed buildings comprise an early 19th century house and its associated coach house. The spatial and historical relationship between the rectory and the coach house positively contributes to the setting of both listed buildings. The assets derive their heritage value from their architectural and historic interest as a Regency period country rectory and their group value. The loss of the listed buildings would be a high adverse impact resulting in a major adverse effect.

9.4.11 The Grade II listed building of 4 and 5 Park Farm (NHLE 1361589) is of moderate heritage value. It comprises an early 19th century farmhouse. The listed building lies wholly within the land required for the construction and operation of the Proposed Scheme and would be demolished for the construction of the Willesley Wood Side cutting. The setting of the heritage asset is defined by its immediate former farmyard and associated outbuildings, and the surrounding agricultural fields, which contribute positively towards the rural character and appearance of the listed building as a former farmhouse. The asset derives its heritage value from its architectural and historical interest as a relatively well-preserved farmhouse. The loss of the building would be a high adverse impact resulting in a major adverse effect.

9.4.12 The following non-designated heritage assets date from the prehistoric and Romano-British periods and illustrate the former settlement of Leicestershire. They are all of moderate heritage value. The archaeological remains associated with these assets would be damaged or destroyed by the construction of Proposed Scheme. This would constitute a high magnitude of impact, and result in a major adverse significance of effect:

- Roman site north-west of The Old Rectory (MLE8596);
- possible cremation burials from east of Heath Lodge (MLE4256); and

- Prehistoric remains, Repton Road (MLE7663, MLE17135).

9.4.13 The following non-designated heritage assets date from the prehistoric and Romano-British periods and illustrate the former rural settlement of Leicestershire. They are all of low heritage value. The archaeological remains associated with these assets would be damaged or destroyed by the construction of the Proposed Scheme. This would constitute a high magnitude of impact, and result in a moderate adverse significance of effect:

- enclosure at No Man's Heath (MLE4552);
- possible cropmark south-east of Chapmans Meadows (MLE21107); and
- cropmarks north-east of Flagstaff Farm (MLE4279).

9.4.14 The following non-designated heritage assets date from the post-medieval period and illustrate the rural settlement pattern of farmsteads, industry and designed landscapes. They are all of low heritage value. The archaeological remains and historic materials associated with these assets would be damaged or destroyed by the construction of Proposed Scheme. This would constitute a high magnitude of impact, and result in a moderate adverse significance of effect:

- Dingle Farm (on first edition OS map);
- Coal workings, Fields Farm (MLE4768);
- Willesley Park (MLE8491);
- Smoile Farm (on first edition OS map); and
- Flagstaff Farm and associated outbuildings (on 1843 Coleorton Tithe map).

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

- Side Hallows Farmhouse (NHLE 1074331), a Grade II listed building of moderate heritage value located next to the land required for the Proposed Scheme, would be affected by the presence of the River Mease viaduct, 180m to the north. The asset comprises an 18th century three storey brick farmhouse. The asset derives its heritage value from its architectural interest and historic and evidential value as a well-preserved farmhouse. Although the agricultural landscape surrounding the listed building has been altered through the removal of field boundaries during the 20th century, the surrounding farmland still contributes to the rural character on this side of the valley, which contrasts with the northern side of the valley, which is now typified by built development. Another aspect of the setting that positively contributes to the heritage value of the listed building is its topographical location on the southern side of the River Mease valley. This contributes to its prominent location in the landscape. The spatial relationship of the farmhouse with its surrounding agricultural buildings and the views towards its main east facing elevation, from which the architectural and historic interests of the building can be readily experienced and appreciated, contribute positively to its setting.

The introduction of the River Mease viaduct into the setting of the listed building would adversely affect views across the asset when viewed from the east as well as disrupt the rural landscape character within its setting. This would affect how the building is understood within its rural context. This would constitute a medium magnitude of impact and a moderate adverse effect.

- Packington Conservation Area is of moderate value. It is located adjacent to the southern edge of the land required for construction of the Proposed Scheme. Its setting is defined by the surrounding agricultural fields, which contribute towards the rural character of the village and historically contributed to the economy of the village. The introduction of new elements of infrastructure, notably the Gilwiskaw viaduct, Vicarage Lane overbridge and balancing ponds, into the landscape to the west of the conservation area will permanently impact upon the setting of the asset. This is assessed to be a medium magnitude of impact and a moderate adverse effect.

Other mitigation measures

9.4.16 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

9.4.17 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.

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

9.5 Effects arising from operation

Avoidance and mitigation measures

9.5.1 The following measures have been incorporated into the design of the Proposed Scheme, which would reduce the impacts and effects on heritage assets as shown on the Map Series CT-06 within the Volume 2: LA3 Map Book:

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

Assessment of impacts and effects

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

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

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

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

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

- Side Hallows Farmhouse (NHLE 1074331); and
- Packington Conservation Area.

Other mitigation measures

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

Summary of likely residual significant effects

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

Monitoring

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

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

10 Land quality

10.1 Introduction

10.1.1 This section of the report presents the baseline conditions that exist along the Proposed Scheme in the Appleby Parva to Ashby-de-la-Zouch 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), and areas of designated mineral resources. Consideration is also given to petroleum (including gas) prospects and licencing.

10.1.2 Engagement has been undertaken with the British Geological Survey (BGS), Leicestershire County Council (LeCC), the Environment Agency, North West Leicestershire District Council (NWLDC), the Coal Authority, the Animal and Plant Health Agency (APHA), the Geological Society Regional Group East Midlands, Leicestershire and Rutland RIGS Group and the Open University Geological Society East Midlands. The purpose of this engagement has been to discuss the Proposed Scheme and potential effects, and obtain relevant baseline information. Engagement will continue as part of the development of the Proposed Scheme and to inform the formal assessment.

10.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2: LA03 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)[77].

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.

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

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

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

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

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

10.2.7 The minerals assessment is based upon the mineral resources[78] identified on published minerals plans, and existing planning or licensed areas. Any inference of minerals provided by geological maps/reports is excluded (except where these are covered by the relevant minerals plans).

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

10.3 Environmental baseline

Existing baseline

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

[78]Defined in the SMR as 'mineral body including aggregates, salt, coal and other hydrocarbons, Petroleum Extraction Development Licences (PEDL), Shale Protection Area (ShPA)'

Geology

10.3.2 This section describes the underlying ground conditions within the Appleby Parva to Ashby-de-la-Zouch area. Recent changes in lithostratigraphic classifications by the BGS have been incorporated where appropriate[79] [80].

10.3.3 Table 17 provides a summary of the geology (made ground, superficial and bedrock units) underlying the study area.

Table 17: Summary of the geology underlying the land quality study area

Geology	Distribution	Formation description	Aquifer classification
Made ground			
Made ground	Present to the north of Measham and east of Ashby-de-la-Zouch, the M42, the A511 Ashby Road, the A512 Ashby Road, and Leicester Road embankments.	Artificial ground comprising variable deposits of reworked natural and man-made materials.	Not classified
Superficial			
Alluvium	Associated with the River Mease, Gilwiskaw Brook, an unnamed tributary extending between Appleby Magna to the River Mease and Saltersford Brook.	Clay silt, sand, peat and gravel.	Secondary A
River terrace deposits	Vicinity of the River Mease with smaller areas to the north and south and Gilwiskaw Brook.	Sand and gravel, locally with silt, clay or peat.	Secondary A
Glaciofluvial deposits	North of Rectory Lane and west of Packington. Isolated areas present in the study area including south-east of Measham and south-east and north-west of Leicester Road.	Sand and gravel, locally with silt, clay or organic material.	Secondary A
Glacial till[81]	Isolated areas to the south of Willesley.	Variable, typically comprising sandy, silty clay with pebbles.	Secondary (Undifferentiated)
Bedrock			
Mercia Mudstone Group - Sidmouth Mudstone Formation	Majority of the study area east of No Man's Heath and south-west of Appleby Parva.	Mudstone and siltstone with thin beds of dolomitic siltstone and sandstone.	Secondary B
Mercia Mudstone Group - Tarporley Siltstone Formation	Majority of the study area south-west and north-east of Measham, south of Ashby-de-la-Zouch.	Sandstone, mudstone and siltstone.	Secondary (Undifferentiated) (mudstone and siltstone) Secondary A

[79] British Geological Survey (2008), *A formational framework for the Mercia Mudstone Group (Triassic) of England and Wales*. Available online at: http://www.bgs.ac.uk/downloads/start.cfm?id=866
[80] British Geological Survey (2012), *Lithostratigraphy of the Sherwood Sandstone. Research Report RR/14/01.* Available online at http://www.bgs.ac.uk/downloads/start.cfm?id=2904
[81] Glacial till is sometimes described as diamicton in the BGS lexicon. The term relates to sediment deposited from land based erosion (such as from landslides and debris flows). In this case the term 'glacial till' refers to diamicton of glacial origin.

Geology	Distribution	Formation description	Aquifer classification
			(sandstone)
Sherwood Sandstone Group - Helsby Sandstone Formation	South-west of Measham, around the A511 Ashby Road and the A42 junction 13, east and south-east of Ashby-de-la-Zouch.	Sandstone, weathering to sand near surface.	Principal
Sherwood Sandstone Group - Chester Formation	Extends through the centre of Measham and to the south of Oakthorpe.	Sandstone with mudstone.	Principal
Sherwood Sandstone Group - Moira Formation	Centre of the study area through Measham and Oakthorpe. Isolated areas through Packington and Willesley.	Sandstone with mudstone	Principal
Pennine Coal Measures Group - Pennine Middle Coal Measures Formation	Central part of the study area north and north-east of Measham with isolated areas within the north and north-east of the study area.	Mudstone, siltstone and sandstone with coal seams.	Secondary A
Pennine Coal Measures Group - Pennine Lower Coal Measures Formation Wingfield Flags Formation	Central and north-western parts of the study area to the north of Measham and west and south of Ashby-de-la-Zouch.	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, sand or marl pits have been backfilled. There is evidence of historical and authorised landfilling within the study area, which may comprise more significant deposits of made ground.

10.3.5 The BGS geological mapping, including artificial ground mapping data, identifies a number of 'Made Ground (undivided) – Artificial Deposit' areas along this section of the route of the Proposed Scheme. These include the M42 embankment fill, the A511 Ashby Road and A512 Ashby Road embankment fill, Leicester Road embankment fill and a number of disused coal disposal sidings.

10.3.6 No farm burial or pyre sites associated with the 1967 and 2001 outbreaks of foot and mouth disease (FMD) are known to be present within the Appleby Parva to Ashby-de-la-Zouch area. The 2001 to 2002 FMD outbreak risk assessment map[82] identifies the study area to lie within a FMD free county. However, older unrecorded sites may be present from the 1967 outbreak. Similarly, anthrax infected cattle burial

[82] Animal Plant and Health Agency (2001), Foot and Mouth Disease 2001 County Status Map 01.10.2001

sites may be present, generally relating to burials over 50 to 100 years ago. However, no records have been found of such burials.

Superficial geology

10.3.7 Alluvium deposits variably comprising silty clay, silt, sand, peat and gravel occur along the courses of streams and rivers. Alluvium is present in the study area associated with the River Mease, Gilwiskaw Brook and Saltersford Brook.

10.3.8 River terrace deposits consisting of sands and gravels of fluvial origin are present in the study area associated with the River Mease and Gilwiskaw Brook.

10.3.9 Glaciofluvial deposits were laid down by glacial meltwaters. They generally comprise coarse granular material. Glaciofluvial deposits are present within the study area around Tamworth Road to the north of Rectory Lane and across an area to the west of Packington. Isolated areas are also present to the south-east of Measham and south-east and north-west of where the study area crosses Leicester Road.

10.3.10 Glacial till deposits typically comprising sandy, silty clay with gravel are present in the study area around Willesley.

Bedrock geology

10.3.11 The Mercia Mudstone Group underlies over half of the study area and is present from Appleby Parva to Measham and to the west of Packington. The Mercia Mudstone Group comprises the Sidmouth Mudstone Formation and the Tarporley Siltstone Formation.

10.3.12 The younger Sidmouth Mudstone Formation comprises predominantly mudstones and siltstones with occasional thin beds of dolomitic siltstone and sandstone. The older Tarporley Siltstone Formation generally has more sandstone content than the Sidmouth Mudstone Formation and is described as siltstones, mudstones and sandstones.

10.3.13 Outcrops of the older Sherwood Sandstone Group are found sporadically across the study area from Stretton en le Field to Measham and to the west of Packington and Ashby-de-la-Zouch. The Helsby Sandstone Formation is typically described as sandstones, weathering to sand where present close to the surface. This formation outcrops in the River Mease Valley. The underlying Chester Formation is locally described as sandstone with thinner beds of mudstone. This formation outcrops through the centre of Measham and to the south of Oakthorpe. The Moira Formation comprises locally-derived rock fragments in a sandy mudstone matrix and this formation is present from the River Mease to Gilwiskaw Brook.

10.3.14 The Pennine Coal Measures Group comprises the Middle Pennine Coal Measures and the Lower Pennine Coal Measures formations and are generally described as interbedded mudstone, siltstone and pale grey sandstone with coal seams. The Pennine Middle Coal Measures Formation outcrops to the north of Measham and overlies the Pennine Lower Coal Measures Formation, which is found to outcrop in several locations from north of Measham to the area north-east of Ashby-de-la-Zouch. A number of outcrops of the Wingfield Flags sandstone and siltstone are also found within this area.

Radon

10.3.15 Radon is a radioactive gas formed by the radioactive decay of naturally occurring uranium in rocks and soils. The occurrence of radon gas is shown in the BGS Radon Potential dataset[83].

10.3.16 Three locations within the study area are located within radon affected areas. This includes land along Mill Street in Packington and extending north of the village, land between Ashby Road and Leicester Road lying adjacent to the A42 and an area east of Ashby-de-la-Zouch along Corkscrew Lane.

10.3.17 In these areas, between 1% and 3% of homes are estimated to have radon levels at or above the action level of 200 becquerels per cubic metre of air (Bq/m3) for residential properties. For the remainder of the study area, less than 1% of homes are estimated to be at or above the radon action level.

Groundwater

10.3.18 Five aquifer designations have been identified within the study area, as defined by the Environment Agency:

- the Sherwood Sandstone Group comprising the Helsby Sandstone Formation the Chester Formation and the Moira Formation are designated as Principal aquifers;
- the Tarporley Siltstone Formation (where sandstone is predominant) of the Mercia Mudstone Group, the Lower and Middle Pennine Coal Measures Formations of the Pennine Coal Measures Group and superficial deposits of alluvium, river terrace deposits and glaciofluvial deposits are designated as Secondary A aquifers;
- the Sidmouth Mudstone Formation of the Mercia Mudstone Group is designated a Secondary B Aquifer; and
- the Tarporley Siltstone Formation (where mudstone and siltstone are predominant) of the Mercia Mudstone Group and glacial till deposits are designated as Secondary (Undifferentiated) aquifers.

10.3.19 The Environment Agency reports that there is one licensed private groundwater abstraction located within the study area. This abstraction is located to the north-west of the M42 junction 11, 500m to the north-west of the land required for the Proposed Scheme, and relates to a private water supply for spray irrigation purposes. It is recognised that there may be other unlicensed unregistered abstractions.

10.3.20 The area from Tamworth Road (M42 junction 11) to where the route of the Proposed Scheme first meets the A42 in Measham, is located within a Groundwater Source Protection Zone (SPZ) Total Catchment (Zone 3). No inner (Zone 1) or outer (Zone 2)

[83] Available at: http://www.bgs.ac.uk/radon/hpa-bgs.html Accessed May 2018. 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

SPZ are identified in the study area. Additionally, the study area is not identified as lying within a groundwater Drinking Water Safeguard Zone.

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

10.3.22 Further information on the groundwater in the Appleby Parva to Ashby-de-la-Zouch area is provided in Section 15, Water resources and flood risk.

Surface water

10.3.23 The River Mease is designated as a main river by the Environment Agency and would be crossed by the route of the Proposed Scheme near Measham. The route of the Proposed Scheme would also cross Gilwiskaw Brook, a main river as designated by the Environment Agency, 300m to the north of Packington. In addition, the route of the Proposed Scheme would cross two tributaries to Coleorton Brook, designated as an ordinary watercourse by the Environment Agency, and a number of drains. In addition, the Proposed Scheme would run parallel to the south-east of Saltersford Brook, designated as a secondary watercourse by the Environment Agency.

10.3.24 A number of unnamed streams, tributaries, drains, ponds and culverts are also located within the study area.

10.3.25 Surface water bodies in the Appleby Parva to Ashby-de-la-Zouch area are described in more detail in Section 15, Water resources and flood risk. The Environment Agency reports that there are no licensed surface water abstractions located within the study area.

10.3.26 The Environment Agency's Drinking Water Protection Areas – Surface Water Safeguard Zone mapping indicates that the northern extent of the study area, north of Ashby-de-la-Zouch, is identified as lying within a surface water safeguarding area under pressure from pesticides.

Current and historical land use

10.3.27 Current potentially contaminative land uses within the study area include one active landfill site, and 10 industrial and commercial sites. The key potentially contaminative sites are:

- a petrol station and service area;
- a depot and scrapyard;
- an engineering works;
- a vehicle dealership; and
- an industrial estate, comprising light and heavy industrial units.

10.3.28 Historical land uses identified within the study area with the potential to have caused contamination include four historical landfill sites, approximately 70 mining sites and approximately eight industrial sites. Infilled pits and ponds may have been filled with a variety of waste materials, but have not been licensed. The key historical potentially contaminative sites are:

- a former railway;
- a former coal crushing plant;
- a former colliery;
- a former brickyard; and
- two former sewage works.

10.3.29 Further details of the key current and historical contaminative land uses within the study area are shown in Table 18, Table 19 and Table 20.

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

Name and area reference	Location	Description
Canal Tip and Measham Landfill (LA03-22, LA03-23)	Extends from north-west to south-east near Burton Road and would be crossed by the route of the Proposed Scheme.	The Environment Agency records that the historical landfill first accepted waste in January 1963 and last received waste in December 1971. No record of licence or licence surrender. A description of the type of waste that this landfill accepted was not available. This landfill comprises two separate areas, the Canal Tip and Measham Landfill, which occupy areas of approximately 0.8ha and 1.5ha respectively.
Oakthorpe Landfill (LA03-39)	Located south of Oakthorpe and north of the A42, 180m to the north-west of the land required for the construction of the Proposed Scheme.	The Environment Agency records that this historical landfill first accepted waste in January 1960 and last received waste in December 1974. No record of licence or licence surrender. The Environment Agency describes the waste received as inert, industrial and household. The landfill occupies an area of approximately is 0.3ha.
Doles Quarry Landfill (LA03-47)	Located along the B587 Nottingham Road to the north-east of Ashby-de-la-Zouch, 50m to the north-west of the land required for the construction of the Proposed Scheme.	The Environment Agency does not have dates for the first and last waste input to this historical landfill site. The licence was active between 1996 and 2011, held by Midland Land Reclamation Ltd. A description of the type of waste that this landfill accepted was not available. The area of this landfill is 4.2ha.
Lount Landfill Site C, Above Ground (LA03-47)	Located along the B587 Nottingham Road to the north-east of Ashby-de-la-Zouch 100m north-west of the land required for the construction of the Proposed Scheme.	The Environment Agency records that the historical landfill first accepted waste in August 1972 and last received waste in August 1991. The licence was granted in 1977 and surrendered in 1991 by Midland Land Reclamation Ltd. The Environment Agency describes the waste received as inert, industrial, commercial and household. The area of this landfill is 4.7ha.
Lount Landfill (LA03-46)	Located within Lount Woodland near Ashby-de-la-Zouch 190m to the north-west of the land required for the construction of	The Environment Agency records that the active landfill first accepted waste in August 1972. No record of licence or licence surrender. The Environment Agency describes the waste received as

Name and area reference	Location	Description
	the Proposed Scheme.	commercial. The landfill occupies an area of approximately 18.9ha.

Table 19: Current and historical mining, mineral sites and colliery spoil sites located within the study area

Name and area reference	Location	Description
Oakthorpe Meer (LA03-94)	Located between Oakthorpe and Measham, running parallel to New Street within the land required for the construction of the Proposed Scheme.	Open cast between 1947 and 1950, working four seams, primarily the Slate coal seam.
Pot Kiln Farm (LA03-95)	Located north of New Street, Measham within the land required for the construction of the Proposed Scheme.	Mined between 1986 and 1987 in the Little Kilburn, Main and Little Woodfield coal seams. Old workings were discovered to a maximum depth of 25m.
Gin Barn Pit (LA03-96)	Along and to the east of the A42 north of Measham within the land required for the construction of the Proposed Scheme.	Mined the Little Cannel between 1949 and 1950, maximum depth of workings to 25m.
Odd House and Field Farm opencast (LA03-25)	Located on both sides of Ashby Road north of Measham within the land required for the construction of the Proposed Scheme.	Field Farm mined 10 coal seams from 1990 to 1992. Odd House was mined around 1998 to 30m
Flagstaff opencast (LA03-14)	Located east of Ashby-de-la-Zouch, now a junction of the A42 within the land required for the construction of the Proposed Scheme.	Mined between 1985 and 1986 to a maximum depth of 30m. Much shallower in other areas.
Lounge Opencast area B (LA03-17)	Located along and primarily to the east of the A42 north of Ashby-de-la-Zouch within the land required for the construction of the Proposed Scheme.	Extensive open cast site mined between 1986 and 1989. A number of areas were worked to depths of greater than 50m.
Colliery (LA03-52)	Located on what is now New Street, partially under the A42 within the land required for the construction of the Proposed Scheme.	Historical mapping indicates that the site was occupied by an unnamed colliery, which was in operation around 1900.
Mine entries and shallow mining areas (LA03-49, LA03-54, LA03-84, LA03-87, LA03-53, LA03-55, LA03-83, LA03-86, LA03-95, LA03-97)	Primarily focused in and to the north of Measham	Numerous mine entries and shallow mine workings for which records are not available. Around 70 mine entries are present in the area around Measham.

Table 20: Key current and historical industrial sites located within the study area

Name and area reference	Location	Description
Petrol station/service area (LA03-03)	Located on the M42 Appleby Magna junction within the land required for the construction of the Proposed Scheme.	Current petrol filling station and service area with associated commercial premises. Including for HGV refuelling.
Westminster Industrial Estate (LA03-05)	Located south-west of Measham along Huntingdon Way within the land required for the construction of the Proposed Scheme.	Historical mapping indicates that the site contained a sewage works and potentially a gas works around 1950. The site is currently occupied by both heavy and light industrial units.
Railway (LA03-31)	Located in Measham running in a south-east to north-west direction partly within the land required for the construction of the Proposed Scheme.	A section of dismantled railway that previously formed part of the Ashby and Nuneaton Joint Railway.
Sewage works (LA03-08)	Located on Measham Road south-west of Packington adjacent to the land required for the construction of the Proposed Scheme.	The Packington Sewage Treatment Works currently in operation by Severn Trent Water.
Historic flour mill (LA03-28)	Located on Mill Street, Packington adjacent to the land required for the construction of the Proposed Scheme.	An historic flour mill once in operation in Packington powered by Gilwiskaw Brook until around the mid-20th century.
Depot/scrap yard (LA03-09)	Located on Ashby Road north of Packington within the land required for the construction of the Proposed Scheme.	Aerial photography indicates that the site is occupied by a depot with an area for scrap metal storage.
Former mill and laundry (LA03-82)	Located on Mill Farm Lane south of Ashby-de-la-Zouch 160m west of the land required for the construction of the Proposed Scheme.	Former mill powered by a tributary of Gilwiskaw Brook, which was converted to a laundry, which ran to the 1960s. Currently a farm.
Engineering works (LA03-10)	Located on Leicester Road east of Ashby-de-la-Zouch within the land required for the construction of the Proposed Scheme.	Currently in operation as WTI Fasteners, a manufacturer of wire thread inserts.
Garages (LA03-11)	Located on Leicester Road, east of Ashby-de-la-Zouch adjacent to the land required for the construction of the Proposed Scheme.	Historical mapping indicates that there were two garages located along Leicester Road. Aerial photography indicates that the garage on the south-western side of Leicester Road is no longer in operation, whilst the garage on the north-eastern side is occupied by Tudor Motors, a vehicle dealership.
Railway (LA03-12)	Intersects the route of the Proposed Scheme running east-west through Ashby-de-la-Zouch	Originally the Leicester and Swannington Railway, it is now a freight-only line which connects the Midland Main Line at Leicester to the Cross Country Route at Burton-on-Trent. Historically it was used primarily to transport coal, although now gravel and granite is more common.

Name and area reference	Location	Description
Historic coal crushing plant (LA03-13)	Located south of the A511 Ashby Road and the A42 junction 13 for Ashby-de-la-Zouch within the land required for the construction of the Proposed Scheme.	Historical mapping indicates that the site was occupied by a coal crushing plant, which serviced the opencast mines at Flagstaff and Lounge. Historical mapping indicates that the site was constructed with the A42, when coal resource in the area was mined to prevent sterilisation in the late 1980s.
Industrial estate and former rifle range (LA03-15)	Located on both sides of Coalfield Way in Ashby-de-la-Zouch 50m west of the land required for the construction of the Proposed Scheme.	A collection of industrial and commercial premises partly built on the site of a former rifle range.

10.3.30 Contaminants commonly associated with sites in Table 18, Table 19 and Table 20 could include metals, semi-metals, asbestos, organic and inorganic compounds. Additionally, infilled pits and landfills could also give rise to landfill gases such as methane or carbon dioxide and leachate. Contamination with pathogens (micro-organisms) and gases such as methane and hydrogen sulphide may also be encountered in relation to the sewage works.

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

Other regulatory data

10.3.32 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 five minor pollution incidents (Category 3) to controlled waters within the study area for the release of oil, sewage and waste pollutants over a four-year period between 1995 and 1998.

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

10.3.34 There is a single permitted local authority pollution prevention control for a petrol filling station (Fina Petrol Station, Shell UK Ltd), located at Atherstone Road, junction 11 of the A42, located approximately 106m to the west of the land required for the construction of the Proposed Scheme.

10.3.35 The Environment Agency reports that there are three consented sewage discharges to groundwater within the study area. Additionally, there are seven consented discharges (with a further nine revoked licences) to surface waters within the study area. Further details on these consents can be found in Section 15, Water resources and flood risk.

10.3.36 There is one nationally significant ecological designated site, as defined in the land quality section of the SMR[84], within the study area. The River Mease is designated both as a SSSI and a special area of conservation (SAC) by Natural England.

10.3.37 Further information on nationally significant ecological designations in the Appleby Parva to Ashby-de-la-Zouch area is provided in Section 7, Ecology and biodiversity.

Mining/mineral resources

10.3.38 There are a range of mining and mineral resources located within the study area that have the potential to be affected by the Proposed Scheme. These include sand, gravel 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 and Gas Authority (OGA) via the issue of Petroleum Exploration Development Licences (PEDLs).

Mineral plans

10.3.39 LeCC is responsible for the overall mineral plan for the county. Current policy is guided by the Leicestershire Minerals Development Framework – Core Strategy and Development Control Policies up to 2021, which was adopted in October 2009. The Leicestershire Minerals Development Framework sets out the key principles to guide the future winning and working of minerals in the county of Leicestershire to the end of 2021.

10.3.40 The document reports no current or proposed mineral extraction allocation sites within the study area.

10.3.41 The Leicestershire Minerals Core Strategy and Development Control Policies document does not specify any MSAs, instead showing just the distribution of resources throughout the study area. The Mineral and Waste Safeguarding document for the North West Leicestershire District, which falls under the proposed LeCC MWLP, identifies one MSA for sand and gravel and one for coal.

10.3.42 The locations of specific mineral and mining resources within the study area are described below.

Sand and gravel deposits

10.3.43 The Mineral and Waste Safeguarding document for the North West Leicestershire District designates a proposed Mineral Safeguarding Area (MSA) for sand and gravel to the north-east of Packington which will be crossed by the route of the Proposed Scheme.

10.3.44 The MSA listed above are proposed and not within the adopted minerals plan for LeCC. They have therefore not been considered in the assessment.

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

Coal mining

Open cast coal mining

10.3.45 Available records from the Coal Authority show that the route of the Proposed Scheme would pass through two adjacent areas of licensed historical open cast coal mining (Old House Farm and Fields Farm) (see Table 3). These are located to the north of Fiveways Wood and south-east of Willesley Wood, respectively. These areas are not licenced for future mining.

Deep coal mining

10.3.46 The Proposed Scheme would intersect an area of proposed coal MSA as delineated by the Mineral and Waste Safeguarding document for the North West Leicestershire District and named the Leicestershire and South Derbyshire Coalfield. The route of the Proposed Scheme would intersect this coalfield at two locations, one to the north of Measham and the second north of Packington to the northern extent of the study area.

10.3.47 The MSA listed above is proposed and not within the adopted minerals plan for LeCC. They have therefore not been considered in the assessment.

10.3.48 Available records from the Coal Authority show that the route of the Proposed Scheme would pass through two areas of historical underground coal mining activity. The southern of these areas lies at and around Measham (extending north as far as Field Farm off the A511 Ashby Road) and the second area lies to the north-east of Ashby-de-la-Zouch. Records state that these coal workings were active throughout the 19th century with the last mine closing in 1986 (Donisthorpe and Measham colliery operation). This coal-bearing area is part of the Leicestershire and South Derbyshire Coalfield and contains seams in the Pennine Middle Coal Measures and in the Lower Coal Measures. In addition, a number of Coal Authority unlicensed open cast mining areas are located at the northern extent of Measham to Willesley Wood and would be crossed by the route of the Proposed Scheme in several places.

10.3.49 Twelve coal seams were worked in either the open cast mines or the underground mines and not all seams are present in the same area due to faulting and the pinching out[85] of certain seams over distance. The thickness of the 12 seams ranged between 0.9m and 3.7m.

10.3.50 The area of underground coal workings described above also has a large number of mine entries indicated; these mark the entrance to a mine working. The route of the Proposed Scheme would cross a number of these mine entries. It is unknown whether the entries are shafts or adits. Available records from the Coal Authority also show the area includes probable shallow coal workings. Probable shallow coal mine workings are defined as 'containing locations and estimated extents of probable shallow workings for which no recorded plan exists, but where it is likely that workable coal at shallow depth has been mined before records were kept'. A number of mine entries are also shown across these areas.

[85] The term 'pinching out' is a geological term for the thinning or tapering out of geological units or seams.

Petroleum exploration and development licences (PEDL/hydrocarbons)

10.3.51 There are no current licences for hydrocarbon resources, including coal or coal bed methane exploitation, and no gas exploration licences[86] within the study area.

Geo-conservation resources

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

Receptors

10.3.53 The sensitive receptors that have been identified within the study area are summarised in Table 21. A definition of receptor sensitivity is given in the SMR.

Table 21: Summary of sensitive receptors

Issue	Receptor type	Receptor description	Receptor sensitivity
Land contamination	People	Residents of existing properties, schools, study centres, play areas, and public open space.	High
		Employees and visitors at commercial areas, retail parks and areas and hotels.	Moderate
		Industrial.	Low
	Surface waters	River Mease and Gilwiskaw Brook.	High
		Newly constructed water storage ponds, Saltersford Brook, tributaries to Coleorton Brook and unnamed streams/tributaries within the study area.	Moderate
		Unnamed drains and small ponds within the study area.	Low
	Groundwater	Principal aquifers.	High
		Secondary aquifers.	Moderate
	Natural environment	River Mease SSSI and SAC.	High
	Built environment	Underground structures and buried services.	Low
Impacts on mining/mineral and petroleum (gas) sites (severance and sterilisation)	Mining/mineral sites	Proposed sand and gravel, bedrock sand mineral safeguarding areas	Moderate
		Leicestershire and South Derbyshire Coalfield, NWLD.	Low

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). The draft CoCP[87] sets out the

[86] Oil and Gas Authority, Onshore Interactive Maps. Available online at: https://ogauthority.maps.arcgis.com/apps/webappviewer/index.html?id=29c31fa4b0024841 8e545d222e57ddaa
[87] Supporting document: Draft Code of Construction Practice

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 (Section 5, 11 and 16);
- the management of human exposure for both construction workers and people living and working nearby (Section 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 (Section 11 and 15);
- a post-remediation permit to work system (Section 11);
- storage requirements for hazardous substances such as oil (Section 5, 11 and 16);
- traffic management to ensure that there is a network of designated haul routes to reduce compaction/degradation of soils (Section 5, 6 and 14);
- methods to monitor and manage flood risk and other extreme weather events which may affect land quality during construction (Section 5 and 16); and
- methods to manage discovery of unknown animal burial pits (Section 6).

10.4.3 The draft CoCP would require that prior to and during construction, a programme of further detailed investigations, which may include both desk based and site based work, takes place in order to confirm the full extent of areas of contamination. It also requires a risk assessment to be undertaken to determine what, if any, site specific remediation measures are required to allow the Proposed Scheme to be constructed safely and to prevent harmful future migration of contaminants. The investigation and assessment of potentially contaminated sites would be undertaken in accordance with Environment Agency CLR11[88] and British Standards BS10175[89] and BS8576[90], and Construction Industry Research and Information Association (CIRIA) SP32[91].

[88] Environment Agency, (2004), *CLR11 Model Procedures for the Management of Land Contamination*.
[89] British Standard, (2011), *BS10175+A2:2017 Investigation of Potentially Contaminated Sites*.
[90] British Standard (2013), *BS8576 Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs).*
[91] CIRIA (1983) SP32 Construction over abandoned mine workings.

10.4.4 Where significant contamination is encountered, a remedial options appraisal would be undertaken to define the most appropriate remediation techniques. Where appropriate, this appraisal would be undertaken based on multi-criteria attribute analysis that considers environmental, resource, social and economic factors in line with the framework set out by the Sustainable Remediation Forum UK. 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: LA03 Map Book.

Land contamination

10.4.7 In line with the assessment methodology, as set out in the SMR, an initial screening process has been undertaken to identify areas of current or historical contaminative use within the study area and to consider which of these areas might pose contaminative risks for the Proposed Scheme. Sites that present a low risk have not been taken further in the assessment. Any moderate to higher risk sites have been taken forward to more detailed risk assessments, in which the potential risks are assessed more fully. The majority of the areas that have undergone the more detailed risk assessments are historical or current landfills, industrial, commercial and mining sites.

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

- whether the site is located on or off the route of the Proposed Scheme or 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 22. 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 22: Summary of baseline CSM for sites which may pose a contaminative risk for the Proposed Scheme

Area reference	Area name	Human health risk	Ground water risk	Surface water risk	Ecosystem risk	Buildings risk
On site						
LA03-04, LA03-06, LA03-07, LA03-37 and LA03-90	Manor House Farm, Treetops Farm, Home/Park Farm, Side Hollows Farm, Flagstaff Farm (Farms group)	Very low to moderate/low	Moderate/low	Moderate	Moderate	Low
LA03-03, LA03-05, LA03-09 to LA03-13, LA03-31, LA03-36, LA03-52 and LA03-78.	Key sites include: petrol stations, garages, Westminster Industrial Estate, areas of railway land and collieries (Industrial/ commercial group)	Moderate/low to high	Moderate	Moderate	Moderate	Moderate/low
LA03-08, LA03-28, LA03-56, and LA03-80.	Packington Sewage Treatment Works, sewage farms and a flour mill (Light industrial/ commercial group)	Very low to low	Moderate/low	Moderate/low	Moderate/low	Low
LA03-14, LA03-17, LA03-25, LA03-27, and LA03-93.	Key sites include: Flagstaff, Lounge B, Odd House and Field Farm (Quarry and open cast backfill group)	Low to moderate/low	Moderate/low	Low	Moderate	Moderate/low
LA03-22, LA03-23 and LA03-46	Canal Tip and Measham Landfill (Landfill group)	Low to moderate/low	Moderate	Low	Low	Moderate/low to moderate
LA03-21, LA03-53, LA03-55, LA03-83, LA03-86, and LA03-94	Shallow mining areas including numerous shafts and mine entries (Shallow mining	Low to moderate	Moderate/low	Low	Moderate/low	Low

Area reference	Area name	Human health risk	Ground water risk	Surface water risk	Ecosystem risk	Buildings risk
to LA03-97.	areas group)					
Off site						
LA03-15, LA03-40, LA03-74, and LA03-75.	A former rifle range and industrial estate, two electrical sub-stations and a gas governor. (Off site industrial/ commercial group)	Low to moderate/low	Moderate/low	Low	Low	Low
LA03-20, LA03-41, LA03-82, and LA03-92.	Settling tanks, several tanks and former mill and laundry (Off site light industrial/ commercial group)	Very low to moderate/low	Moderate	Moderate/low	Moderate/low	Low
LA03-39 and LA03-47.	Doles Quarry and Lount C (Off site landfill group)	Very low to moderate	Moderate	Moderate/low	Moderate/low	Moderate
LA03-49 LA03-54, LA03-84, and LA03-87.	Shallow mining areas including numerous shafts and mine entries (Off site shallow mining areas group)	Very low to moderate/low	Moderate/low	N/A	Moderate/low	Moderate/low

Temporary effects

10.4.11 In order to identify potential temporary effects, the baseline and construction CSM have been compared to determine the change in level of risk at receptors during the construction stage, and thus to define the level of effect at the construction stage.

10.4.12 Where there is no change between the main baseline risk and the main construction risk, the temporary effect significance is deemed to be negligible even if the risk is deemed to be high. For example, this would be the case where the construction of the Proposed Scheme does not alter the risks from an existing potentially contaminated site that is outside the area required for construction.

10.4.13 A worsening risk at construction stage compared to baseline would result in a negative effect, and conversely, an improvement would result in a positive effect. The assessment assumes that contamination would be controlled through the general measures in the draft CoCP.

10.4.14 In the event that unexpected contamination is encountered during the construction of the route in this area, this would be remediated as described in the draft CoCP resulting in an overall beneficial effect.

10.4.15 All of the sites set out in Table 22 have been assessed for the change in impact associated with the construction stage for the work. Table 23 presents a summary of the resulting construction effects that have been found to be significant. All other sites referenced in Table 22 were found to have non-significant effects.

Table 23: Summary of construction CSM effects

Name and area ref	Receptor	Main baseline risk range	Main construction risk range	Temporary effect
On site				
LA03-21, LA03-53, LA03-55, LA03-83, LA03-86, and LA03-94 to LA03-97. Shallow mining areas including numerous shafts and mine entries (Shallow mining areas group)	Human health – (direct contact, ingestion, inhalation of vapours from contaminated soils, waters and inhalation of ground gases on site)	Low to moderate/low	Moderate	Minor adverse to moderate adverse
	Controlled waters - groundwater	Moderate/low	High	Moderate adverse
	Impact on property – ground gas and aggressive ground	Low	Moderate	Moderate adverse
Off site				
LA03-49 LA03-54, LA03-84, and LA03-87. Shallow mining areas including numerous shafts and mine entries (Off site shallow mining areas group)	Human health – (direct contact, ingestion, inhalation of vapours from contaminated soils, waters and inhalation of ground gases on site)	Very low to moderate/low	Moderate	Minor adverse to moderate adverse
	Controlled waters - groundwater	Moderate/low	High	Moderate adverse
	Impact on property – ground gas and aggressive ground	Low	Moderate	Moderate adverse

10.4.16 The extent to which mine water and mine gas is controlled is subject to ongoing investigation. For mining sites, potential for significant adverse effects has been identified associated with mine gas and mine water in historical workings. Any mitigation measures required will be identified, in consultation with authoritative consultees, including measures to be set out in the draft CoCP, to mitigate any significant effects.

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

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

10.4.19 The A42 Measham cutting would pass through the historic Canal Tip landfill and the River Mease viaduct would pass close to the historic Measham Landfill, both of which may require excavation into what is expected to be backfilled material. The nature of backfilled material and whether or not it is lined is unknown, and there is the potential to generate a large quantity of material which may need treatment to render it suitable for re-use.

10.4.20 Construction compounds located in this study area could include the storage of potentially hazardous substances, such as fuels and lubricating oils, and may also be used for temporary storage of potentially contaminated soils. Mitigation measures set out within the draft CoCP include measures to manage the risks associated with the storage of such materials resulting in no significant effects.

Permanent effects

10.4.21 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.

10.4.22 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 adverse effects and an improvement would result in beneficial effects.

10.4.23 All of the sites set out in Table 22 have been assessed for the change in impact associated with the permanent post-construction stage. Table 24 presents the summary of the resulting post-construction effects that have been found to be

significant. All other sites referenced in Table 22 were found to have non-significant effects.

Table 24: Summary of permanent (post-construction) effects

Name and area reference	Receptor	Main baseline risk range	Main post-construction risk range	Post-construction effect
LA03-04, LA03-06, LA03-07, LA03-37 and LA03-90 (Farm group) Manor House Farm, Treetops Farm, Home/Park Farm, Side Hollows Farm, Flagstaff Farm	Controlled waters – groundwater	Moderate/low	Very low to low	Minor beneficial to moderate beneficial (significant)
	Controlled waters – surface waters	Moderate	Low	Moderate beneficial (significant)
	Ecological/geological designations.	Moderate	Low	Moderate beneficial (significant)
LA03-03, LA05, LA03-09 to LA03-13, LA03-31, LA03-36, LA03-52 and LA03-78. (Industrial/commercial group) Petrol stations, garages, Westminster Industrial Estate, areas of railway land and collieries	Human health (direct contact, ingestion, inhalation of vapours from contaminated soils, waters and inhalation of ground gases on site)	Moderate/low to high	Very low to low	Moderate beneficial to major beneficial (significant)
	Controlled waters – groundwater and surface waters	Moderate	Low	Moderate beneficial (significant)
	Ecological/geological designations	Moderate	Low	Moderate beneficial (significant)
LA03-08, LA03-28, LA03-56, LA03-80. (Light industrial/ commercial group) Sewage works, sewage farms and a flour mill	Controlled waters – groundwater and surface waters	Moderate/low	Very low to low	Minor beneficial to moderate beneficial (significant)
LA03-14, LA03-17, LA03-25, LA03-27, LA03-93. (Quarry or opencast backfill group) Flagstaff, Lounge B, Odd House and Field Farm	Controlled waters – groundwater	Moderate/low	Very low to low	Minor beneficial to moderate beneficial (significant)
	Impact on property receptors – ground gas and aggressive ground conditions	Moderate/low	Very low to low	Minor beneficial to moderate beneficial (significant)
	Ecological/geological designations	Moderate	Low	Moderate beneficial (significant)
LA03-22, LA03-23	Controlled waters – groundwater	Moderate	Low	Moderate beneficial (significant)

Name and area reference	Receptor	Main baseline risk range	Main post-construction risk range	Post-construction effect
(Landfills group) Canal Tip, Measham Landfill	Impact on property receptors – ground gas and aggressive ground conditions	Moderate/low to moderate	Very low to low	Minor beneficial to moderate beneficial (significant)

10.4.24 Table 24 indicates that where remediation is carried out on sites identified within the land required for the construction of the Proposed Scheme, there will in most instances, be overall moderate beneficial effects which are considered to be significant.

10.4.25 In relation to the potential significant effects associated with mining sites at construction stage, there will be a greater level of knowledge and understanding of the mine workings ground model and the best means to mitigate the potential effects on a permanent basis.

10.4.26 Additional site-specific permanent remediation measures, that could focus on source removal, pathway breakage or receptor protection, would be developed during the detailed design stage if required. These measures would ensure that risks to people and property from gas and vapours in the ground, the principal risk in this area, would be controlled to an acceptable level.

Mining/mineral resources

10.4.27 Construction of the Proposed Scheme has the potential to affect existing mineral resources and proposed areas of mineral exploitation. This could occur by sterilisation of the resource through direct excavation during construction of the Proposed Scheme or through temporary and/or permanent severance or isolation that may occur during the construction phase of the Proposed Scheme, possibly continuing through to its operation.

10.4.28 There are no MSA defined in the adopted minerals plan and all MSA discussed previously are proposed within the minerals plan under consultation and therefore not considered as part of the assessment.

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.

Summary of likely residual significant effects

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

10.5 Effects arising from operation

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

Avoidance and mitigation measures

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

Assessment of impacts and effects

10.5.3 The Proposed Scheme within this area would include the Appleby Magna auto-transformer station, which would be located south of Manor House Farm, and the Packington mid-point auto-transformer station, which would be located north of the B4116 Measham Road. An auto-transformer station, feeder stations and sub-stations can, in principle, be a source of contamination through accidental discharge or leaks of coolant. However, in common with other modern sub-stations, secondary containment appropriate to the level of risk would be included in the installed design.

10.5.4 The operation of the trains may give rise to minor contamination through leakage of hydraulic or lubricating oils. However, such leakage or spillage is expected to be very small and unlikely to result in significant contamination.

Other mitigation measures

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

Summary of likely residual significant effects

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

Monitoring

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

11 Landscape and visual

11.1 Introduction

11.1.1 This section of the report presents the assessment of the likely significant landscape and visual effects identified to date within the Appleby Parva to Ashby-de-la-Zouch 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 North West Leicestershire District Council (NWLDC), Leicestershire County Council (LeCC) 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: LA03 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)[92].

11.2.2 Summer surveys for the landscape and visual assessment were undertaken from July to September 2017, and winter surveys from January to March 2018, to inform the assessment. Further surveys will be undertaken to inform the assessment and will be reported in the formal ES.

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

[92] 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 ZTV have been produced in line with the methodology described in the SMR and are an indication of the theoretical visibility of the Proposed Scheme. In some locations, extensive vegetation cover would mean the actual extent of visibility is substantially less than that shown in the ZTV, and professional judgement will be used to further refine the study area to focus on likely significant effects.

11.2.5 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 from the centre line of the route of the Proposed Scheme have been assessed as part of the study area.

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 visual effects during construction covers the situation in winter at peak activity. The assessment of operational visual effects covers the situation in winter and summer of year 1 and summer of year 15. The assessment of landscape effects is undertaken for the construction phase and for the operational phase at both year 1 and year 15. The landscape assessment does not consider seasonal variations e.g. winter/summer, since these do not affect character. Likely significant landscape and visual effects for year 30 will be reported in the formal ES.

11.2.8 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 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 Salt Street, located approximately 1.1km south-west of Appleby Parva and runs up to approximately 1.1km north-east of junction 13 of the A42. The area is predominantly rural in character, despite the presence of the M42

and the A42 and the town of Ashby-de-la-Zouch and village of Measham. The River Mease crosses the study area and divides the open rural landscape to the south from the more wooded and mixed-use agricultural land that forms part of the National Forest, to the north.

11.3.2 The landform of the study area is characterised by a series of gently undulating, long, low ridgelines and shallow river valleys. The land falls from a high point of around 120m AOD at Salt Street to around 80m AOD in the River Mease valley, next to Measham. It then rises to about 160m AOD near Hall Farm near the northern edge of the study area, beyond which the land falls away to the north-east.

11.3.3 The main watercourse within the study area is the River Mease, a slow-moving and meandering lowland river, with a largely natural character. The river crosses the study area near Measham in an open, shallow valley. The River Mease and the lower part of its tributary, the Gilwiskaw Brook, are designated as a special area of conservation (SAC) and site of special scientific interest (SSSI).

11.3.4 The predominant land use within the study area is agriculture, consisting of mainly arable farmland, with areas of improved pasture and with gently rolling and undulating fields. The highway infrastructure of the M42, the A42 and associated junctions and connecting roads is a distinct element in the landscape, although the established planting within highway land and nearby areas of semi-mature woodland have helped to integrate the highways into the landscape and to screen the traffic.

11.3.5 Whilst there are several common landscape elements and features within the study area, there are also noticeable differences. The land to the north of the River Mease, which lies within the National Forest, has substantial areas of woodland and is noticeably different to the more open farmland located south of the River Mease. North of Measham, land on the east side of the A42 is mainly rural, while the west side of the A42, as well as being wooded, has an urban and suburban element to its character, being occupied in large part by the town of Ashby-de-la-Zouch.

11.3.6 There are several settlements within the study area, including rural farmsteads, the hamlet of Appleby Parva, villages including Appleby Magna, Oakthorpe, Packington and Measham, and the town of Ashby-de-la-Zouch.

11.3.7 The M42/A42 is the major road within the study area. Other notable roads are the A444 Atherstone Road, Tamworth Road, the A511 Ashby Road and the A512 Ashby Road that cross the study area roughly perpendicular to the M42 and the A42. The majority of other roads within the study area are minor country roads that link the local settlements. There is one railway line that crosses the study area in a north-west to south-east direction, east of Packington, the Leicester to Burton upon Trent line. There are also several abandoned railway lines, which no longer operate. The route of the former Ashby Canal, subject to a proposed restoration project, crosses the study area at Measham.

11.3.8 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[93] and the East Midlands Regional Landscape Character Assessment[94], the National Forest Strategies 2004-2014 and 2014-2024, the North Warwickshire Landscape Character Assessment[95], the Hinckley and Bosworth Landscape Character Assessment[96], and the North West Leicestershire Settlement Fringe Assessment[97]. The published LCAs have been adapted for this assessment to provide LCAs of an appropriate and consistent scale. Minor amendments have also been made to some published LCA boundaries to reflect existing conditions.

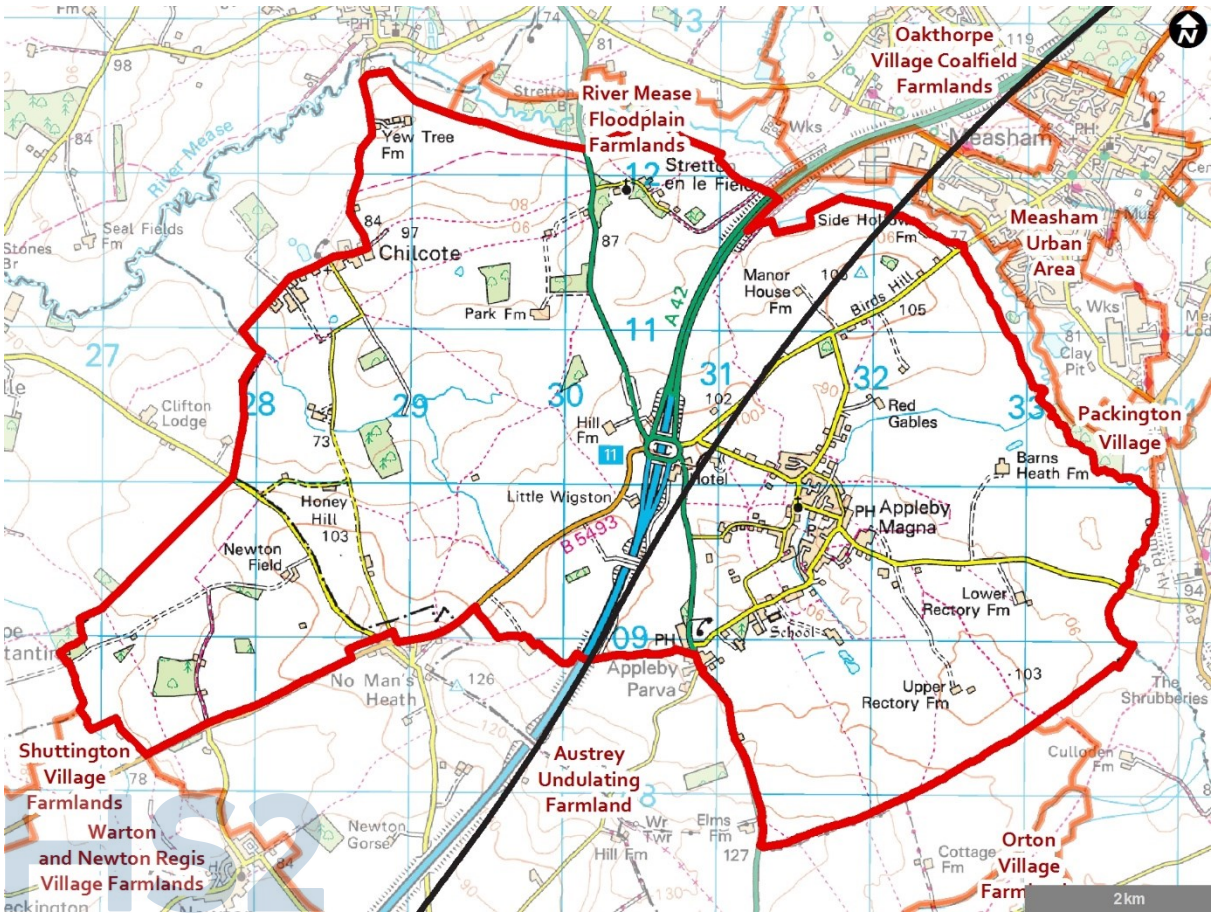
11.3.9 For the purposes of this assessment, the study area for Appleby Parva to Ashby-de-la-Zouch has been subdivided into 11 LCAs. These LCAs are draft and subject to review in consultation with local planning authorities. Full descriptions of all LCAs will be provided in Volume 5 of the formal ES.

11.3.10 Two of the 11 LCAs would not be significantly affected by the Proposed Scheme on account of their distance from the Proposed Scheme or the small proportion of the LCA affected. Austrey Undulating Farmland LCA would be significantly affected by the Proposed Scheme and is included in Volume 2: Community area report LA02: Birchmoor to Austrey as it is located for the most part within the Birchmoor to Austrey area. Packington Enclosed Farmlands LCA and Calke Wooded Parklands LCA would be significantly affected by the Proposed Scheme and are included in Volume 2: Community area report LA04: Coleorton to Kegworth as they are located for the most part within the Coleorton to Kegworth area. A summary of the remaining six LCAs that would be significantly affected within the Appleby Parva to Ashby-de-la-Zouch area is provided in Table 25.

[93] Natural England (2013, 2014), *National Character Area profiles*. Available online at: https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles
[94] Natural England's East Midlands Region (2010), *East Midlands Regional Landscape Character Assessment*. Available online at: http://publications.naturalengland.org.uk/publication/5635681403535360?category=2431119
[95] North Warwickshire Borough Council (2010), *North Warwickshire Landscape Character Assessment*. Available online at: https://www.northwarks.gov.uk/downloads/download/1668/landscape_character_assessment_downloads
[96] Hinckley & Bosworth Borough Council (2017), *Hinckley & Bosworth Landscape Character Assessment.* Available online at: http://www.hinckley-bosworth.gov.uk/downloads/download/308/landscape_character_assessment
[97] North West Leicestershire District Council (2010), *North West Leicestershire Settlement Fringe Assessment.* Available online at: https://www.nwleics.gov.uk/files/documents/settlement_fringe_assessment_august_2010/Settlement%20Fringe%20Assessment%20-%20August%202010.pdf

Table 25: Summary of significantly affected LCAs

Appleby Magna Village Farmlands

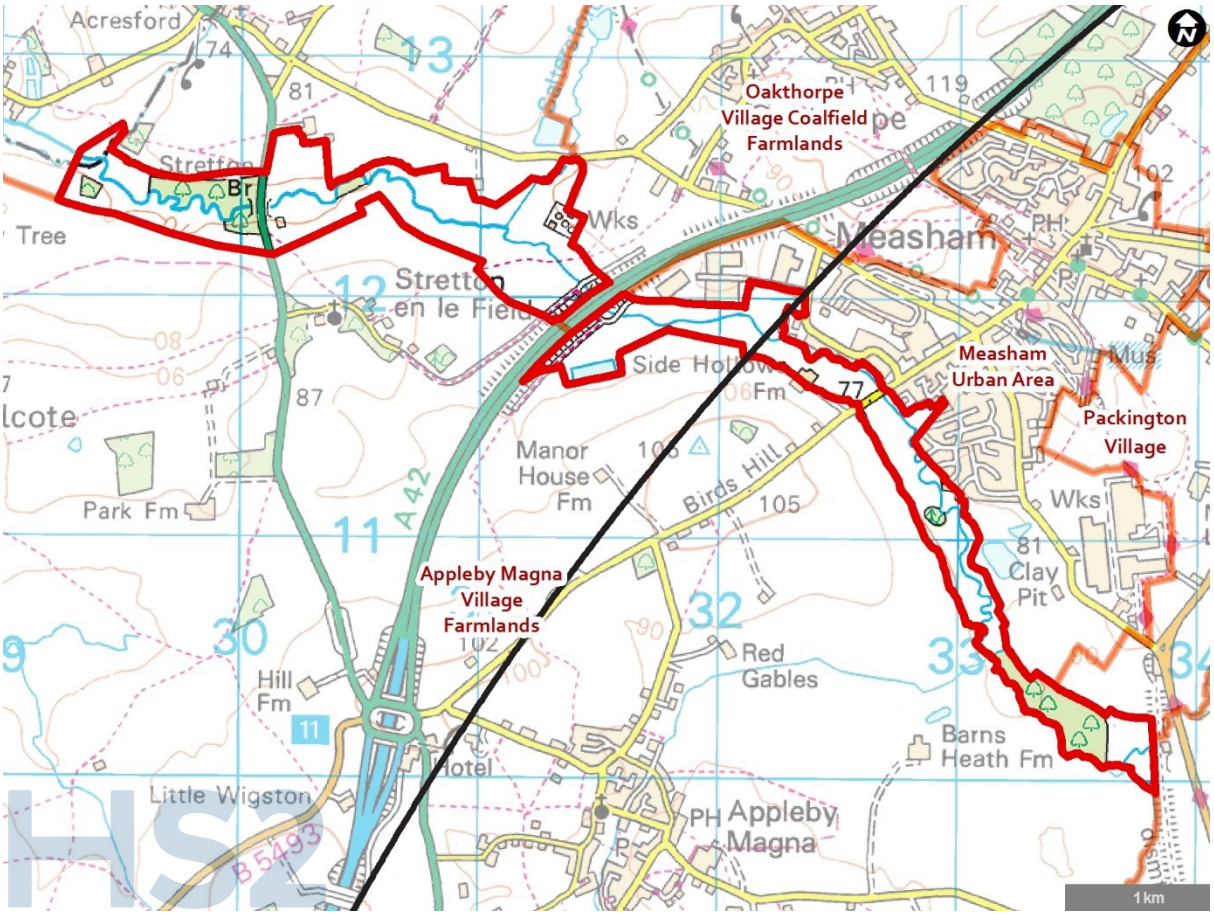


Open landscape east of M42

Open landscape north of Appleby Parva

The Appleby Magna Village Farmlands LCA is a large rural area of flat to gently rolling lowland vale, comprising a mix of arable fields and pasture. Field sizes vary from small scale pasture fields located on the western side of the village of Appleby Magna to large arable fields located to the east of Appleby Magna and on the western side of the M42 and A42. Many field boundaries have been removed to maximise arable farming and those that remain are predominantly low and trimmed with occasional trees. There is little tree cover in the LCA apart from a few pockets of woodland, some located west of No Man's Heath being ancient semi-natural woodland. The landscape consequently has an open character, with little enclosure, providing expansive skies and far-reaching views across the LCA. The M42/ A42 dissects the LCA, adversely affecting scenic quality, and the traffic movement and noise detract from an otherwise tranquil area.The village of Appleby Magna is located near the centre of the LCA, occupying a shallow valley, with the hamlet of Appleby Parva nearby. A brook flows through Appleby Magna towards the River Mease to the north. The village has a rich history with evidence of occupation dating back to the Iron Age. It includes a designated conservation area and several listed buildings, including the Parish Church of St. Michael's and All Angels Church. The church is in an elevated position and its tower with recessed spire is a local landmark.This LCA is assessed as having a medium landscape value derived from the strong rural character, relative tranquillity, historic Appleby Magna, and the presence of detracting influences of the M42/ A42.

River Mease Floodplain Farmland



Floodplain farmland south of Measham

River Mease

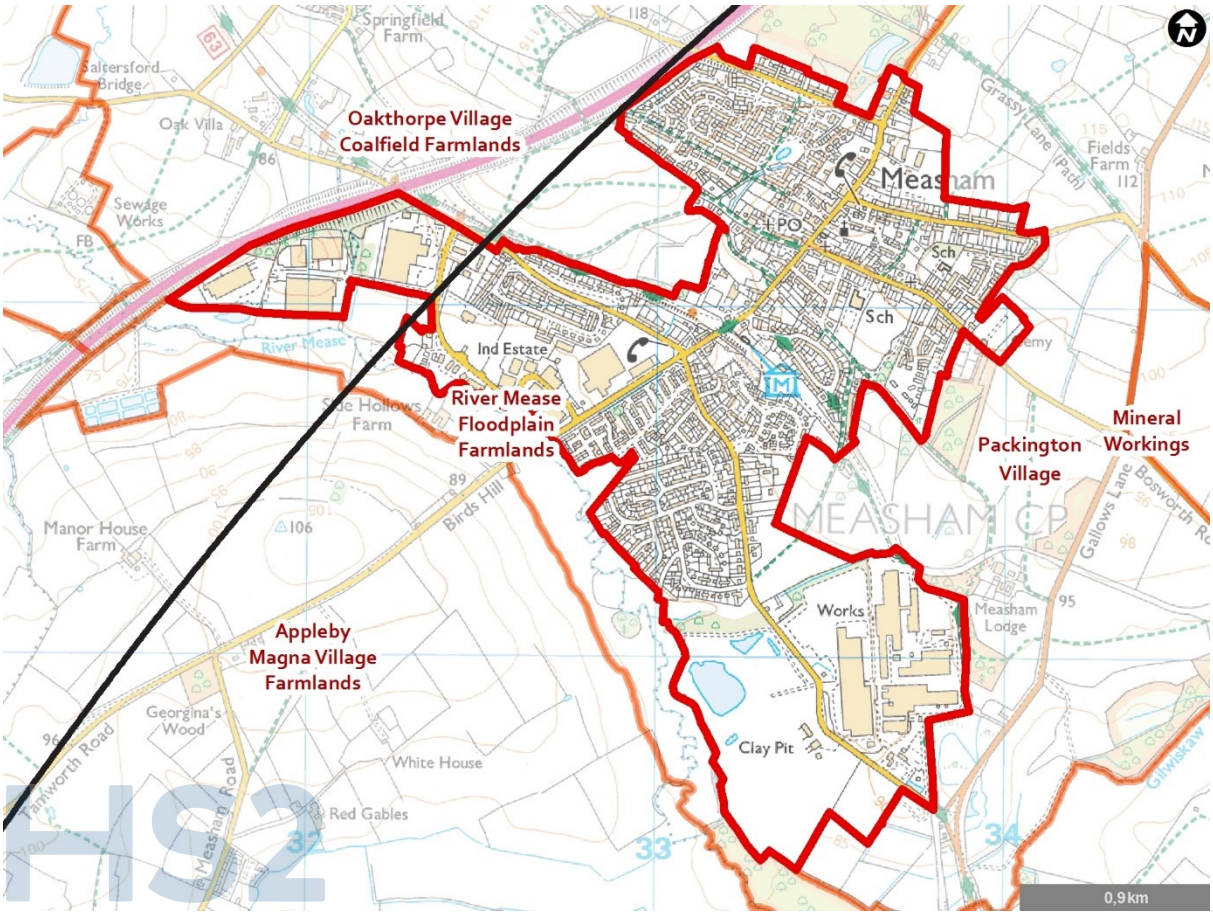
The River Mease Floodplain Farmland LCA, is a long, narrow, low-lying area of farmland that occupies the floodplain of the River Mease. It lies between the Appleby Magna Village Farmlands LCA and the urban LCA of Measham. The LCA is an open landscape of flat and slightly undulating, predominately pastoral farmland, of mainly medium sized fields.

The LCA is divided by the A42 which crosses the river on a large well-vegetated embankment. Highway traffic noise from the A42 notably detracts from an otherwise tranquil area. A PRoW crosses underneath the A42 connecting the east and west sides. Other than the A42, the LCA and river are only crossed by one local road, Bird Hill.

The River Mease, which is designated for its ecological value as a SAC and a SSSI, follows a meandering course, with the line of the river often delineated by trees and shrubs. On the western side of the A42, the landscape is more open in character, with only low clipped hedgerows forming the boundary with adjacent arable land. On the eastern side of the A42, the LCA abuts the urban fringe of Measham, with the tree lined river corridor generally forming the boundary. Although vegetation provides a buffer between the LCA and Measham, industrial buildings are visible against the skyline, which detracts from the rural character of the LCA. The river forms the southern boundary of the National Forest.

The River Mease Floodplain Farmland LCA has a medium landscape value derived from the rural character, the ecologically important River Mease, and the presence of detracting influences of the A42 and the adjacent urban fringe.

Measham



Measham High Street

Residential area in west of Measham

Measham LCA extends northwards from the River Mease, along a shallow valley. It includes the village and the larger-scale industrial estates around the village edge.

The historic centre of Measham is designated as a conservation area. The settlement was founded in the Saxon period, with the core of the village, centred around the High Street, being medieval in origin. The conservation area is characterised by a dense development of terraced groups, with late Victorian and modern buildings dispersed throughout. Red brick walls and tiled or slate roofs are the most characteristic building materials. The parish church, the Church of St. Laurence, a Grade II* listed building, is set on a slightly elevated plateau, and its tower forms a landmark in some long distance views of the village.

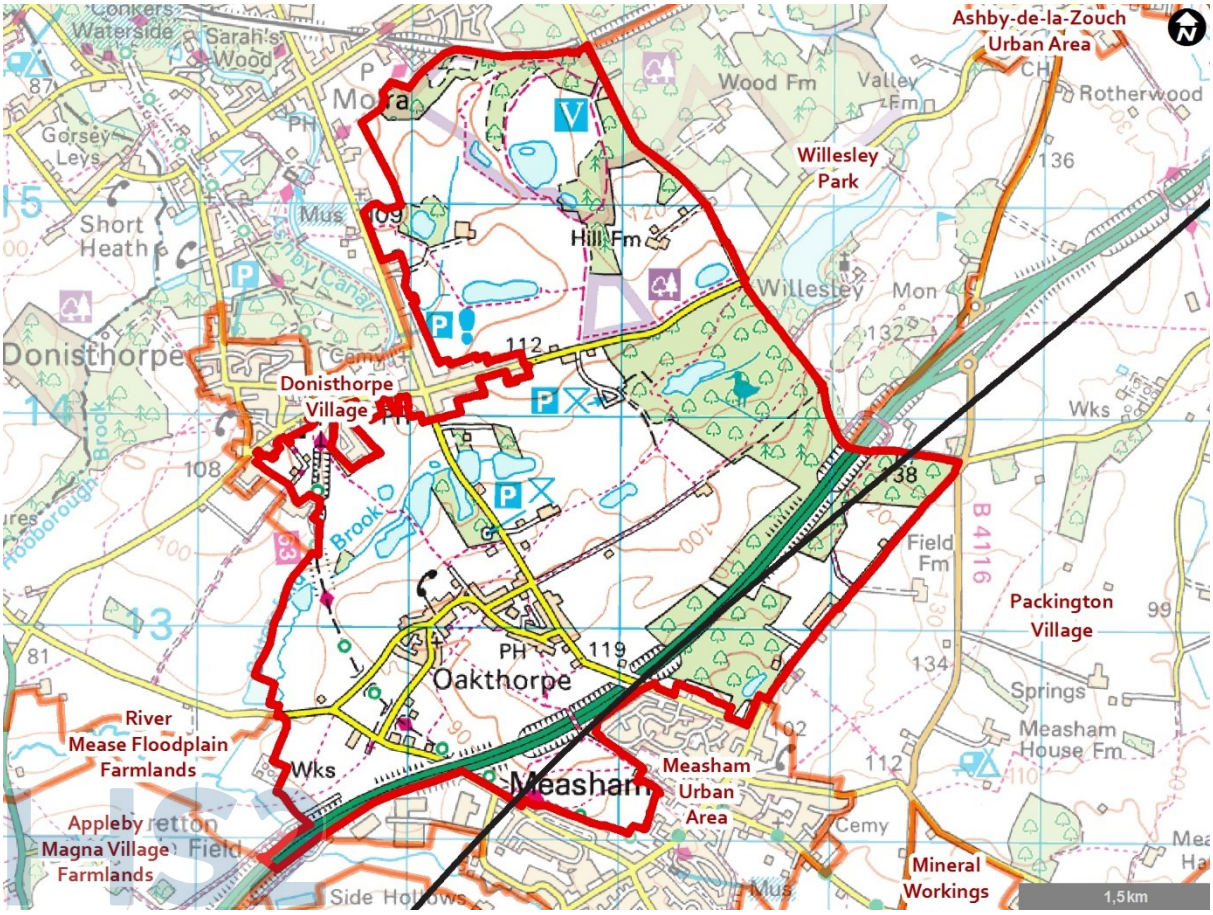
The High Street forms the main shopping street through Measham. The central section of the village includes Measham Leisure Centre, Measham Library, Measham Museum, and Measham Medical Centre. West of the High Street, a large undeveloped area remains, bordered on both sides by post-war suburban housing. There are two industrial fringe areas: the modern Westminster Industrial Estate located on the south-western edge of Measham, and the works on the south-eastern edge of the village. Both areas occupy low-lying land adjacent to the River Mease floodplain, and are characterised by large-scale modern industrial buildings, forming prominent features, of limited scenic value. The associated infrastructure detracts from tranquillity.

The Ivanhoe Way long distance recreational path, the Ashby Woulds Heritage Trail, and National Cycle Network (NCN)

Route 63 follow the same route, along the disused Ashby and Nuneaton Joint Railway line between Measham and Donisthorpe. Leicestershire Footpath P85/86 follows the route of the abandoned Ashby Canal west of the High Street. The proposed Ashby Canal Restoration project aims to restore the Ashby Canal through Measham.

Measham LCA has a medium landscape value derived from the designated conservation area, open space and recreational value, and the presence of detracting influences of the industrial fringe.

Oakthorpe Village Coalfield Farmlands



Woodland south of A42

Landscape south of Oakthorpe

The Oakthorpe Village Coalfield Farmlands LCA is a gently undulating rural area. The landform is influenced by the underlying geology of the Pennine Coal Measures Group, which has formed a series of low hills and ridges and shallow valleys. The Saltersford Brook runs through the LCA and there are many ponds within its valley. Extraction of the coal by open cast working, together with clay working, has left a legacy of former mine sites, clay pits and disused railway lines. Many former mining areas have been restored, and are associated with wooded plantations, created as part of the National Forest. Large areas on either side of the A42, including the northern side of Measham, have been recently planted.

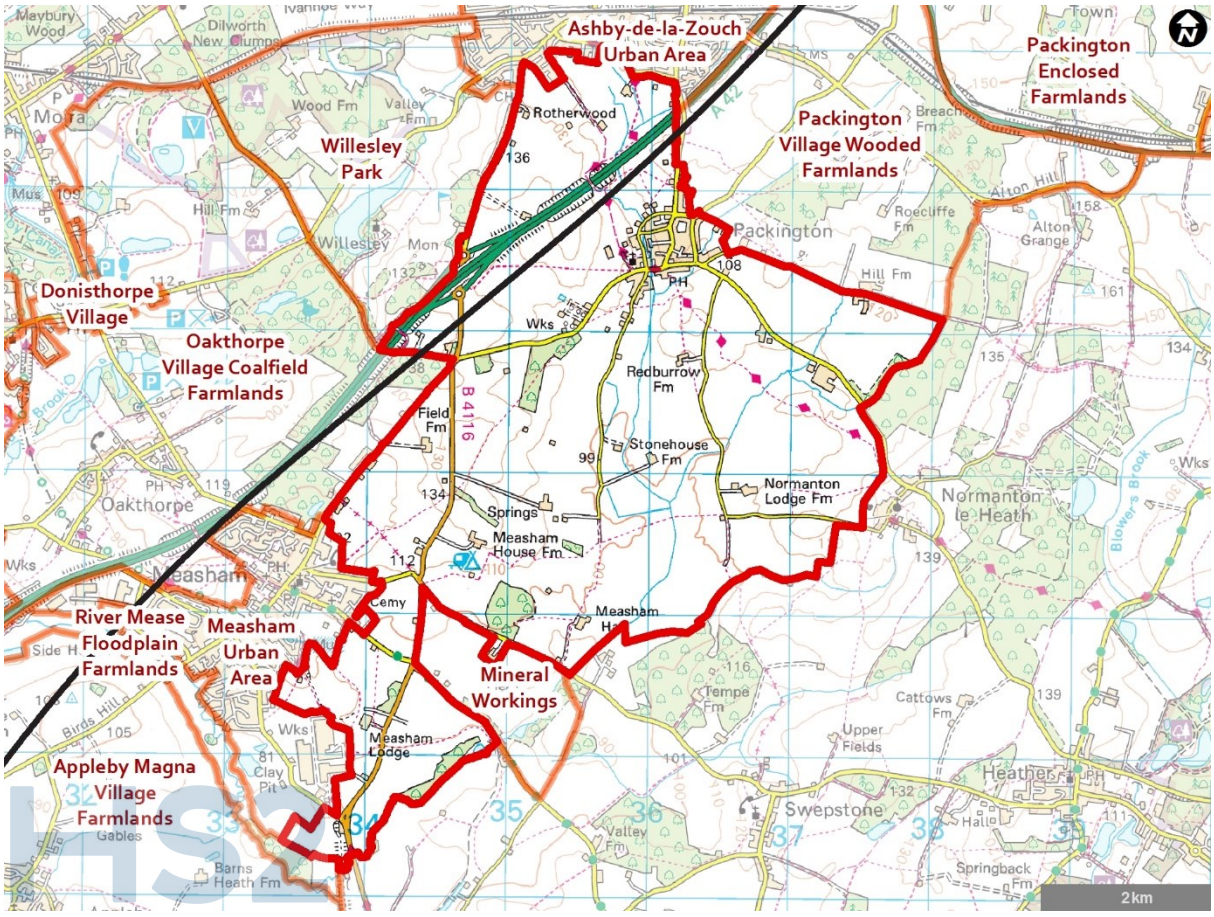
The LCA has a strong rural character. Agricultural land within the LCA is generally arable, with medium-large fields delineated by low clipped hedgerows with a few hedgerow trees.

Settlements within the LCA include Oakthorpe village located around 500m to the north-west of the A42, and occasional, scattered farmsteads. The larger and more dispersed village of Donisthorpe lies a further 1.5km to the north-west, just outside the LCA. Highway traffic noise from the A42 notably detracts from an otherwise tranquil area.

There are areas of publicly accessible woodland, including Parker's Wood, Fiveways Wood and Willesley Wood. These are located at the heart of the National Forest and provide value for wildlife, open space for the local community, incorporating picnic sites and a network of paths. There are several PRoW within the LCA, including the long-distance Ivanhoe Way, the Ashby Woulds Heritage Trail and NCN Route 63. The LCA is a landscape of popular recreational use, with well-developed public access.

The Oakthorpe Village Coalfield Farmlands LCA has a medium landscape value derived from its strong rural character, large areas of woodland within the National Forest, recreational value, and the presence of detracting influences of the A42.

Packington Village Farmlands



Landscape north of Packington

Measham Road approach to Packington

Packington Village Farmlands LCA is underlain by mudstones and siltstones, giving rise to a gently rolling landform. It comprises substantial areas of agricultural land, largely arable farmland, but also pasture, and fields used as solar farms (Ashby Solar Farm).

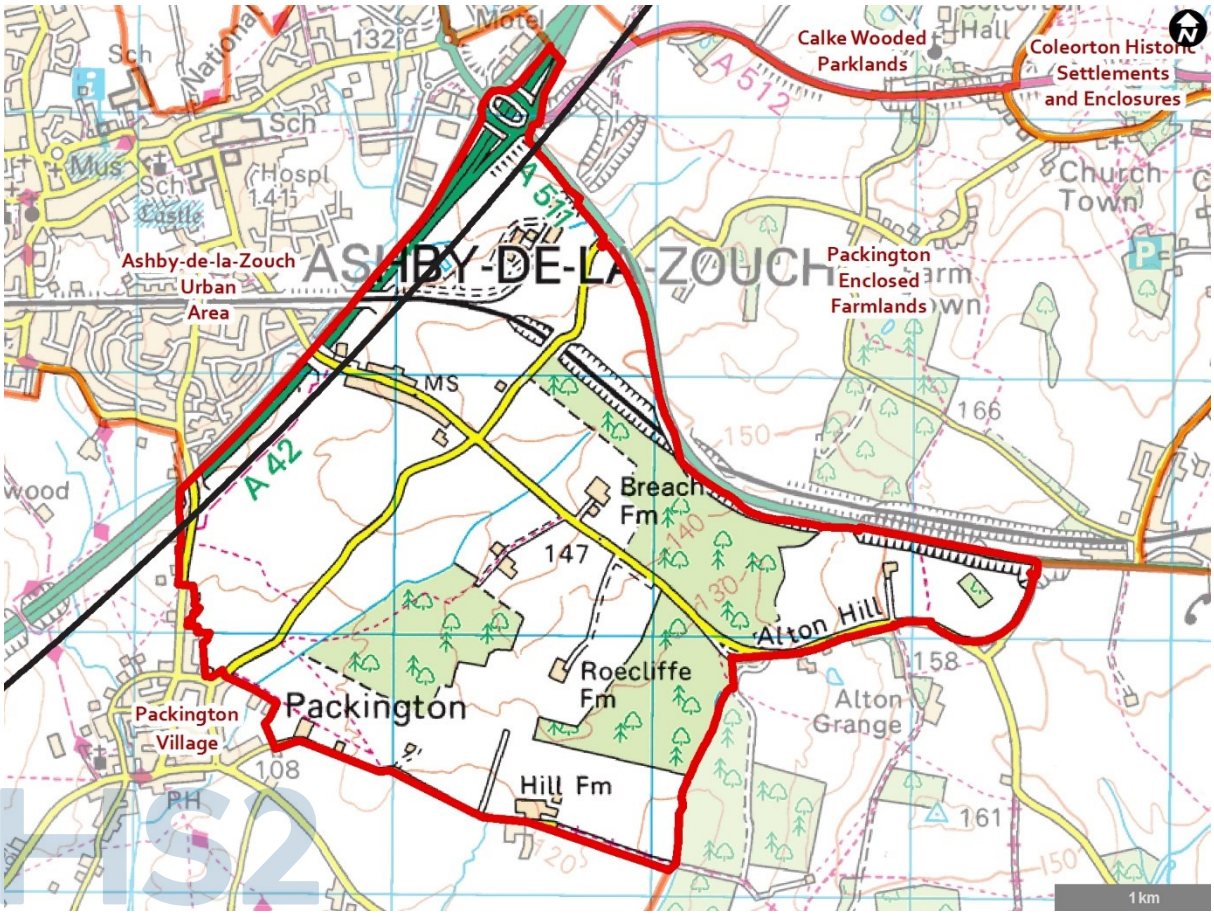
Field boundaries generally comprise low clipped hedgerows, with a few hedgerow trees. Some of the hedgerows forming the boundaries with local roads and watercourses are taller and thicker. In addition to the hedgerows, there are several small copses within the study area. The combination of substantial hedgerows and copses give the impression of a wooded character in some parts of the LCA, although actual tree cover within the LCA is limited. The LCA includes a variety of priority habitats: grazing marsh, lowland fen, semi-improved grassland and deciduous woodland. The LCA is located within the National Forest.

The historic village of Packington is the most notable settlement within the LCA, located on both sides of the Gilwiskaw Brook. Much of the central and western part of the village is designated as a conservation area. The historic buildings, use of local materials, and surrounding agricultural fields contribute to the rural character of the village. The western part of Packington includes a 13th century church, Church of the Holy Rood, which is Grade II listed. More modern housing occupies the eastern part of the village.

There is a good network of PRoW within the LCA, including the National Forest Way. Several minor roads radiate from Packington: these are generally narrow, with hedgerow boundaries, and contribute to the rural character of the LCA. Highway traffic noise from the A42 notably detracts from an otherwise tranquil area.

The Packington Village Farmlands LCA has a medium landscape value derived from the strong rural character, relative tranquillity, historic village of Packington, and the presence of detracting influences of the A42.

Packington Village Wooded Farmlands



Landscape south of New Packington

Houses on Leicester Road, New Packington

The Packington Village Wooded Farmlands LCA shares some characteristics with the Oakthorpe Village Coalfield Farmlands LCA, being underlain by the Pennine Coal Measures Group and having an undulating landform of low hills, ridges and shallow valleys.

The LCA has a strongly rural character. Land use is a mix of agriculture and plantation woodland, with large areas of woodland providing the prominent characteristic. The LCA lies within the National Forest. Agricultural land is generally arable, with medium-large fields delineated by low clipped hedgerows with a few hedgerow trees. Smaller pasture fields with more substantial hedgerows are located near to the village of Packington.

There is little settlement apart from the linear residential development of New Packington, located on the eastern side of the A42, along Leicester Road, which leads into Ashby-de-la-Zouch. New Packington comprises post-war housing. There are few PRoW within the LCA. Highway traffic noise from the A42 on the western edge of the LCA notably detracts from an otherwise tranquil area.

The Packington Village Wooded Farmlands LCA has a medium landscape value derived from the strong rural character, relative tranquillity, large areas of woodland within the National Forest, and the presence of detracting influences of the A42.

Visual baseline

11.3.11 A summary description of the distribution and types of receptors most likely to be affected is provided below. The viewpoints are numbered to identify their locations and are shown on the viewpoint location maps (see Volume 2: LA03 Map Book, Map Series LV-03 and LV-04). In each case, the middle number (xxx.**xx**.xxx) identifies the type of receptor that is present in this area – 1: Protected views (none within this area), 2: Residential, 3: Recreational areas 4: Transport, 5: Hotels/healthcare/education and 6: Employment.

11.3.12 Residential views within the area are obtained from the larger settlements of Measham and Ashby-de-la-Zouch; villages such as Appleby Magna, Oakthorpe and Packington; smaller villages and hamlets such as Appleby Parva and New Packington and numerous individual farmsteads and other properties.

11.3.13 The predominant infrastructure through the study area is the M42 and A42 corridor with associated elements, such as junctions, side roads and vertical elements (e.g. lighting, signage and gantries). The extent to which the A42 dominates viewpoints depends upon its proximity. At close range it is very noticeable, whilst further away, where it is gradually filtered and enclosed by intervening vegetation, it has limited influence. The A42 is particularly prominent near Measham and Ashby-de-la-Zouch, with the character of many views in these areas being influenced by it and its associated infrastructure. Views from settlement edges in the Appleby Parva to Ashby-de-la-Zouch area are typically filtered and framed by intervening hedgerows and road side planting, which combined with the gently undulating landform, restricts open views to some degree.

11.3.14 The employment areas on the eastern side of Ashby-de-la-Zouch are heavily planted with views enclosed by modern buildings and structure planting and restricted to the immediate streetscape. In Measham views are in general similarly restricted though there are longer views into the surrounding countryside in the Mease valley from Huntingdon Way and Repton Road.

11.3.15 The degree of visibility from PRoW is varied, with some having open views dominated by the A42 corridor and the larger settlements of Measham and Ashby-de-la-Zouch. Views from PRoW within the undulating rural landscape are typically restricted by landform, woodland, hedgerows.

11.3.16 Travellers on rural roads and lanes generally experience mixed visibility with restricted views due to mature roadside hedgerows and trees enclosing the highway corridors, allowing only glimpses of the landscape beyond. However, there are also open views where roadside vegetation and hedgerows are low or absent.

11.3.17 For travellers on the M42 and the A42 much of the route is in cutting where the landform prevents views outside the highway corridor. Similarly, highway planting of trees and large shrubs now screen the views outwards along much of the study area, especially in summer, with restricted filtered views in winter. There are, however, sections of road on embankment or at grade where there are views out from the highway over the landscape.

11.3.18 There are only a few recreational areas in the study area. They are located within Appleby Parva, Appleby Magna, central locations within Measham and on the eastern sides of Ashby-de-la-Zouch. The views from these recreational areas are generally limited in extent due to the presence of intervening built features, landform and different types of vegetation cover.

11.3.19 Outward views from the conservation areas at Appleby Magna and Packington are rural in nature. Views are partially restricted by the gently undulating landform, mature hedgerows and trees that frame and edge the agricultural fields, PRoW, roads and other areas of the rural landscape. Views from the conservation areas at Measham and Ashby-de-la-Zouch are generally in an urban setting and restricted or framed by built features. There are occasional open views on the edges of these conservation areas, which have a more urban edge character, and are less restricted and more open.

11.4 Temporary effects arising during construction

11.4.1 As is commonplace with major infrastructure works, the scale of the construction activities means that works would be visible from many locations and would have the potential to give rise to significant temporary effects that cannot practicably be mitigated. Such effects are temporary and would vary over the construction period depending on the intensity and scale of the works at the time. The assessment of landscape and visual effects has been based on the activities occurring during the peak construction phase, which is defined as the period during which the main construction works would take place, including the presence of compounds, main earthworks and structure works.

11.4.2 The effects associated with the peak construction stage in this area are generally considered to be medium-term, based on the indicative construction programme in Section 2.3. It is currently anticipated that the peak civil engineering stage in this area would be undertaken between the start of 2023 and the end of 2024. Effects during other stages of works are likely to be less intensive due to less construction equipment being required at the time and a reduced intensity of construction activity.

11.4.3 Section 2.2 sets out the key permanent features of the Proposed Scheme and Section 2.3 describes the construction compounds and associated temporary works that have been considered in this assessment.

Avoidance and mitigation measures

11.4.4 Measures that have been incorporated into Sections 12 and 14 of the draft Code of Construction Practice (CoCP)[98] 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[99];
- use of well-maintained hoardings and fencing;
- prevention of damage to the landscape features adjacent to the construction sites due to movement of construction vehicles;
- designing lighting to avoid unnecessary intrusion onto adjacent buildings and other land uses; and
- replacement of any trees intended to be retained which may die as a consequence of nearby construction works.

11.4.5 Implementation of these measures has been taken into account in the assessment of the construction effects.

Assessment of temporary impacts and effects

11.4.6 The most apparent changes to the landscape and to the views experienced by visual receptors during construction would relate to the presence of construction plant, compounds and soils and material storage and stockpiling. Key construction activities that would give rise to the most apparent changes to landscape and visual receptors are: the excavation of cuttings; erection of viaducts; construction of embankments; the removal of existing landscape elements including trees and hedgerows; and the closure and diversion of existing public highways and PRoW. Other key changes include: the construction of overbridges and underbridges, auto-transformer stations, and overhead line equipment; utility diversions; the presence of transfer nodes and pre-cast yards and demolition of buildings and structures.

[98] Supporting document: Draft Code of Construction Practice
[99] BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations, 2012, British Standard.

Landscape assessment

11.4.7 Based on the current design it is anticipated that the LCAs set out in Table 26 would be significantly affected during construction of the Proposed Scheme.

Table 26: Summary description and assessment of effects on LCAs

Appleby Magna Village Farmlands	**Medium susceptibility and sensitivity**
Susceptibility to change: The open character and rural qualities of the landscape impart a medium susceptibility to change arising from the Proposed Scheme. The scale of construction activities in the predominantly rural landscape would change the character of a wide corridor through the centre of the LCA. Earthwork operations for Appleby Parva and Appleby Magna cuttings would affect landform. Bridge construction works and realignment of the A444 Atherstone Road and Tamworth Road would be prominent. Loss of agricultural land, hedgerows, woodland copses and motorway planting close to the M42 junction 11 would result in a more open landscape increasing the prominence of the M42. Demolition works required for removal of two heritage assets (listed buildings) at The Old Rectory would impact on heritage value. Construction vehicle movements, crane activity and noise associated with the Atherstone main compound and three satellite compounds would detract from the tranquillity of the rural landscape, adding to the existing effects on the LCA from M42 traffic. There would therefore be a high magnitude of change and a major adverse effect.	**Level of effect:** Major adverse (significant)
River Mease Floodplain Farmland	**Medium susceptibility and sensitivity**
Susceptibility to change: The open character of the landscape, the presence of the River Mease SAC and SSSI, and rural qualities of the landscape albeit with urban influences, impart a medium susceptibility to change arising from the Proposed Scheme. Construction of the River Mease viaduct and Appleby Magna embankment No. 2 would substantially alter the landscape character of the LCA with direct impacts on landform, landscape features and characteristic vegetation. The construction would also cause severance of the landscape and affect tranquillity. Between the A42 and Tamworth Road extensive land requirements, large scale of construction activity, construction of the River Mease viaduct south satellite compound, and landform and land cover changes, would detract from the predominantly rural landscape character, including a corridor of around 1km in length alongside the River Mease. Construction activities would require the removal of pasture, agricultural land and hedgerow boundaries, as well as trees and shrubs that delineate the river. The removal of vegetation would result in a wide corridor of more open landscape. The open character of the floodplain would be changed by the large-scale earthworks. Construction vehicle movements and noise added to existing effects of road traffic will further reduce tranquillity. There would therefore be a high magnitude of change and major adverse effect.	**Level of effect:** Major adverse (significant)
Measham	**Medium susceptibility and sensitivity**
Susceptibility to change: The mix of qualities of the urban landscape, including the distinctive historic centre, widespread post-war housing, and the low scenic quality of the industrial fringe impart a medium susceptibility to change arising from the Proposed Scheme. A relatively small part of the LCA would be directly affected, but construction of the River Mease viaduct would be prominent and require demolition of several industrial buildings of the Westminster Industrial Estate. Construction of the A42 Measham cutting would involve the demolition of residential properties	**Level of effect:** Moderate adverse (significant)

at Amersham Way, changing the character of the western end of the development and introducing construction activity into a residential area. Activities associated with the River Mease viaduct north satellite compound, equipment, site haul routes and stock piles would introduce uncharacteristic elements into the area of open space on the western side of the village. Construction of Measham embankment No. 1 would further impact on landscape character. There would therefore be a medium magnitude of change and moderate adverse effect.	
Oakthorpe Village Coalfield Farmlands	**Medium susceptibility and sensitivity**
Susceptibility to change: The undulating landscape, the presence of publicly accessible woodlands associated with the National Forest, and rural qualities of the landscape impart a medium susceptibility to change arising from the Proposed Scheme. Land requirements for construction would impact on the rural gap between Measham and Oakthorpe. Excavation of cuttings would introduce changes to landform. The large transfer node area adjacent to New Street would represent a temporary uncharacteristic feature. Construction activities, including realignment of New Street and associated activities and bridge construction work at New Street overbridge satellite compound would be prominent and uncharacteristic on the outskirts of Oakthorpe. Removal of agricultural land, hedgerow boundaries and extensive areas of woodland would be required including some recent National Forest planting on both sides of the existing A42. This would result in a wide corridor of more open landscape and change the characteristics of the eastern part of the LCA. A farmstead (Treetops Farm) located close to the realigned A42, would be demolished, with adverse impact on the rural character. There would therefore be a medium magnitude of change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
Packington Village Farmlands	**Medium susceptibility and sensitivity**
Susceptibility to change: The open rolling landscape, the presence of Packington Conservation Area, and the rural qualities of the landscape impart a medium susceptibility to change arising from the Proposed Scheme. Much of the land between Packington and the A42 would be required for construction. The scale of activity, including Vicarage Lane overbridge satellite compound, and Gilwiskaw Brook viaduct satellite compound would detract from the character of the predominantly rural landscape and the setting of Packington and its conservation area. Vehicle movements and noise would reduce tranquillity. Loss of agricultural land uses, trees and hedgerows would result in a wide corridor of more open landscape. The landscape character would be changed by large-scale earthworks and machinery/ vehicles required to create the proposed Measham Road Packington cutting, Vicarage Lane overbridge, and Ashby-de-la-Zouch cutting No. 1. These features would alter the local characteristics of the rolling landform. Construction works would adversely affect a wide corridor through the LCA. There would therefore be a high magnitude of change and major adverse effect.	**Level of effect:** Major adverse (significant)
Packington Village Wooded Farmlands	**Medium susceptibility and sensitivity**
Susceptibility to change: The undulating landscape, National Forest woodland and rural qualities of the landscape impart a medium susceptibility to change arising from the Proposed Scheme. Loss of agricultural land uses, trees and hedgerows would result in a wide corridor of more open landscape. Excavation of Ashby-de-la-Zouch cuttings Nos.1 and 2 would introduce landform changes and result in the demolition of one residential property in New Packington. Cranes and other construction machinery constructing Leicester Road overbridge and Leicester to Burton Railway overbridge would impose on the rural skyline. Activities associated with the Leicester Road overbridge satellite compound, and movement of construction vehicles along site haul routes would be noticeable in	**Level of effect:** Major adverse (significant)

the rural landscape. The scale of construction activity and changes to landform and land cover would affect the character of the predominantly rural landscape. There would therefore be a high magnitude of change and major adverse effect.	

Visual assessment

Introduction

11.4.8 The following section describes the likely significant effects on visual receptors during construction. The construction assessment has been undertaken for the winter period, in line with best practice guidance, to ensure a robust assessment. However, in some cases, visibility of construction activities may be reduced during summer when vegetation, if present in a view, would be in leaf.

11.4.9 Where a viewpoint represents multiple types of receptor, the assessment is based on the most sensitive receptors. Effects on other receptor types with lower sensitivity would be lower than those reported.

11.4.10 Night-time surveys will be undertaken to inform the assessment in the formal ES. Potential visual impacts arising from additional lighting at night during construction within the area may arise from continuous working and/or overnight working. Assessment of these effects will be reported in the formal ES on completion of the night time assessment.

11.4.11 Table 27 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: LA03 Map Book.

Table 27: Construction phase potentially significant visual effects

View west from Dingle Lane (Leicestershire Bridleway Q19/3), Appleby Parva **(VP 359-03-001) (Map Number LV-03-359)**	**Medium-high sensitivity visual receptors**
Bridleway users would have close and middle-distance views of the construction works including those associated with Appleby Parva cutting. Earthworks, construction equipment, vehicle movement, and material stockpiles would be prominent in the view. The introduction of construction activity, and the removal of pasture fields would change the character of the existing view. Traffic on the M42 would be more visible due to loss of mature vegetation. Construction activity would result in substantial change in the existing view. There would therefore be a high magnitude of visual change and major adverse visual effect.	**Level of effect:** Major adverse (significant)
View north from Dingle Lane (Leicestershire Bridleway Q19/3), Appleby Parva **(VP 359-03-002) (Map Number LV-03-359)**	**Medium-high sensitivity visual receptors**
There would be close and middle-distance views of construction activity including that associated with Appleby Parva cutting, and longer distance views towards construction of Appleby Magna embankment No.1, and Atherstone Road main compound. Associated earthworks, construction equipment, construction vehicle movement and material stockpiles would be prominent in the view. This construction activity would result in substantial change in the existing view for bridleway users. There would therefore be a high magnitude of visual change and major adverse visual effect.	**Level of effect:** Major adverse (significant)
View north-west from residences on the A444 Atherstone Road adjacent to Appleby House, Appleby Parva	**High sensitivity visual receptors**

(VP 359-02-004) (Map Number LV-03-359)	
Residents of Appleby Parva and users of the A444 Atherstone Road would have medium distance views of the construction area, including earthworks and construction vehicle movements, and Appleby Parva cutting in the background. The M42 would be perceptible in the distance following loss of vegetation. The construction activities would noticeably alter key characteristics of the background of the view. There would therefore be a medium magnitude of visual change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
View north-west from residences on Tamworth Road, south of Measham **(VP 360-02-004) (Map Number LV-03-360)**	**High sensitivity visual receptors**
Residents on Tamworth Road would have close views of the construction of the River Mease viaduct, Appleby Magna embankment No.2 and activities associated with the River Mease viaduct satellite compound. The River Mease viaduct would be highly visible during its construction. Construction equipment, movement of construction vehicles, and material stockpiles would be prominent in the view. As a result of these construction activities, combined with the change to characteristics of the view, there would therefore be a high magnitude of visual change and major adverse visual effect.	**Level of effect:** Major adverse (significant)
View north-west from Tamworth Road, south of Measham **(VP 360-04-005) (Map Number LV-03-360)**	**Low sensitivity visual receptors**
Road and footpath users would have close and medium distance views of the construction area and construction activities, extending across the middle distance to the viewpoint. Construction of the River Mease viaduct and associated activities would be prominent in the middle distance of the view. Construction of the Proposed Scheme would result in the removal of existing vegetation and loss of arable fields. Uncharacteristic feature, partially filtered by intervening vegetation would be introduced. There would therefore be a medium magnitude of change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
View north-west from Huntingdon Way, Measham **(VP 360-04-007) (Map Number LV-03-360)**	**Low sensitivity visual receptors**
There would be near to middle distance views of the construction area including the River Mease viaduct. Retained existing vegetation outside the construction area, rising landform and industrial buildings would screen vehicle movement, views of construction equipment and material stockpiles. However, the Proposed Scheme on viaduct up to 5.7m in height above Burton Road would be visible. Therefore, for people travelling along Huntingdon Way and for employees within the industrial estate, there would be a high magnitude of visual change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
View west from residences and public open space/play area on Dysons Close, Measham **(VP 360-02-008) (Map Number LV-03-360)**	**High sensitivity visual receptors**
Residents and users of Dysons Close would have close to medium distance views of the construction area and associated construction activities including those associated with the River Mease viaduct. Existing foreground vegetation and buildings in the middle distance would provide limited screening. The existing houses have two storeys and there would be clearer views of the construction area from the top floors. Construction of the River Mease viaduct would be prominent in the long-distance view. Substantial change would be partially screened/ filtered by intervening vegetation. There would therefore be a medium magnitude of visual change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
View south from Repton Road, Measham **(VP 360-04-009) (Map Number LV-03-360)**	**Low sensitivity visual receptors**
Users of Repton Road and of the adjacent industrial area would have close views of construction activities including those associated with River Mease Viaduct, Appleby Magna Embankment No.2 and River Mease Viaduct south satellite compound. This viewpoint is located at the edge of the land required for	**Level of effect:** Moderate adverse

construction of the Proposed Scheme where vegetation would be removed. There would be close views of earthworks, construction equipment, movement of construction vehicles and material stockpiles. This construction activity would result in substantial change to close distance views. There would therefore be a high magnitude of visual change and moderate adverse visual effect.	(significant)
View north-west from residences on Chapel Street, Measham **(VP 361-02-003) (Map Number LV-03-361)**	**High sensitivity visual receptors**
Residents and users of Chapel Street would have middle distance views of construction activities including those associated with the A42 Measham cutting and the A42 realignment. Earthworks, construction equipment, movement of construction vehicles, and material stockpiles would be prominent in the view. This viewpoint is located in an elevated area and receptors would experience substantial alteration to key characteristics of the view as a result of the construction of the Proposed Scheme. There would therefore be a high magnitude of visual change and major adverse visual effect.	**Level of effect:** Major adverse (significant)
View north-west from residences and village centre car park off High Street, Measham **(VP 361-02-001) (Map Number LV-03-361)**	**Residents: High sensitivity visual receptors**
Residents, users of Measham Leisure Centre and associated access road and car park would have long-distance views of construction activities including those associated with Measham embankment No. 1, the A42 Measham cutting and the A42 realignment. Earthworks, construction equipment, movement of construction vehicles, and material stockpiles would be noticeable in the view. There would be substantial change partially screened by intervening vegetation in the foreground and middle distance. There would therefore be a medium magnitude of visual change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
View north-west from Leicestershire Footpath O68/4, west of Packington **(VP 362-03-008) (Map Number LV-03-362)**	**Medium-high sensitivity visual receptors**
Footpath users at this location would have close views of the construction area from an elevated position. There would be close views of construction activities including those associated with Measham Road Packington cutting, the B4116 Measham Road overbridge, the B4116 main compound, the Measham Road Packington culvert. Earthworks, construction equipment, movement of construction vehicles, and material stockpiles would be prominent in the view. This viewpoint is located in an elevated position and construction activity would be continuously highly visible across the view. There would therefore be a high magnitude of visual change and major adverse visual effect.	**Level of effect:** Major adverse (significant)
View north-west from Leicestershire Footpath O72/1, north-east of Packington **(VP 363-03-006) (Map Number LV-03-363)**	**Medium-high sensitivity visual receptors**
Footpath users at this location would have close to long distance views of the construction from an elevated position. There would be close views of construction activities including those associated with Ashby-De-La-Zouch cutting No.1, Ashby Road south overbridge and Ashby Road south overbridge satellite compound. Construction of the Proposed Scheme would remove pasture fields and scattered trees, and would introduce new features and components that would be continuously highly visible across close and long-distance views. There would therefore be a high magnitude of visual change and major adverse visual effect.	Level of effect: Major adverse (significant)
View north-west from a field gate on Coleorton Road **(VP 363-04-008) (Map Number LV-03-363)**	**Low sensitivity visual receptors**
Users of Coleorton Lane would have middle to long distance views of construction activities, including those associated with Ashby-De-La-Zouch cutting No.1 and Leicester Road overbridge, from an elevated position. Construction of the Proposed Scheme would remove vegetation within the land required for construction of the Proposed Scheme. Construction activity would be prominent in the open landscape,	Level of effect: Moderate adverse (significant)

resulting in the substantial alteration to the rural characteristics of the view. There would therefore be a high magnitude of visual change and moderate adverse visual effect.	
View north-west from residences on Leicester Road, New Packington **(VP 363-02-012) (Map Number LV-03-363)**	**High sensitivity visual receptors**
Residents along and users of Leicester Road would have close to medium distance views of construction activities including those associated with Ashby-De-La-Zouch cutting No.1 and Leicester Road overbridge and close views of topsoil/ temporary storage stockpiles. Residents on Leicester Road would experience substantial alteration to key characteristics of close views as a result of the construction of the Proposed Scheme. There would therefore be a high magnitude of change and major adverse visual effect.	Level of effect: Major adverse (significant)
View north-west from residences on Leicester Road, New Packington **(VP 363-02-013) (Map Number LV-03-363)**	**High sensitivity visual receptors**
Residents along and users of Leicester Road would have close views of construction activities including those associated with Ashby-De-La-Zouch cutting No.1 and Leicester Road overbridge. Vegetation removed in the middle distance would open up the view but the view would still be partially enclosed and framed with existing features either side of Leicester Road. There would be noticeable change to key characteristics of the view from this location as a result of the construction of the Proposed Scheme. There would therefore be a medium magnitude of change and moderate adverse visual effect.	Level of effect: Moderate adverse (significant)

Other mitigation measures

11.4.12 To further reduce the significant effects described above, consideration will be given during the detailed design stage to where planting can be established early in the construction programme to help achieve earlier landscape and visual integration. However, not all landscape and visual effects can be mitigated due to the visibility of construction activity and the sensitivity of surrounding receptors. No other mitigation measures are considered practicable during construction.

Summary of likely residual significant effects

11.4.13 The temporary residual significant effects during construction remain as described above. These effects would be temporary and reversible in nature lasting only for the duration of the construction works. These residual effects would generally arise from the widespread presence of construction activity and construction plant within the landscape and viewed by surrounding residents, and users of PRoW and main roads within the study area.

11.4.14 The significant effects that would remain after implementation of construction phase mitigation are summarised below:

- major adverse effects in relation to four LCAs;
- moderate adverse effects in relation to two LCA;
- major adverse visual effects at three residential viewpoint locations;
- moderate adverse effects at four residential viewpoint locations;
- major adverse visual effects at four recreational viewpoint locations; and
- moderate adverse visual effects at four road user 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 (such as Appleby Magna embankments No.1 and No.2) and cuttings (such as Ashby-de-la-Zouch cuttings No.1 and No.2) into their wider landscape context and to mitigate views of structures and overhead line equipment from sensitive receptors, where reasonably practicable. Earthworks design also takes account of the relationship to surrounding land uses and management, such as agriculture;
- woodland, scrub and hedgerow planting to screen the Proposed Scheme from nearby residential properties in the town of Ashby-de-la-Zouch, the village of Measham, in villages and hamlets such as Appleby Parva, Appleby Magna, Oakthorpe, and Packington, and from other individual farmsteads and recreational facilities such as long distance recreational routes and other PRoW. The proposed planting would also help to conserve the setting of the conservation areas of Appleby Magna, Measham and Packington;
- compensatory woodland planting in areas of loss, using the same species composition and planting types (and appropriate planting density), such as woodland planting to compensate for the partial loss of Fiveways Wood, and to provide habitat connectivity, enhanced landscape/green infrastructure connectivity, as well connectivity of historic landscape features, where reasonably practicable, and to visually soften embankments and viaduct abutments;
- hedgerow replacement and restoration in areas of loss to restore connectivity and landscape pattern, where reasonably practicable, and using an appropriate palette of hedgerow types and species. This would tie the Proposed Scheme mitigation into the wider landscape character; and
- compensation for loss of field ponds with new wetlands, ecological ponds and biodiversity wetland features and wetland enhancement in the River Mease and Gilwiskaw Brook corridors.

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 River Mease and Gilwiskaw Brook viaducts, the Leicester to Burton

Railway overbridge, the realigned A42, the presence of earthworks, retaining walls, one auto-transformer station and one mid-point auto-transformer station. Other aspects include the presence of overhead line equipment and noise fence barriers.

Landscape assessment

11.5.4 Based on the current design, it is currently anticipated that the LCAs described in Table 28 would be significantly affected during operation of the Proposed Scheme.

Table 28: Operational phase significant landscape effects

Appleby Magna Village Farmlands	**Medium susceptibility and sensitivity**
Susceptibility to change: The open character and rural qualities of the landscape impart a medium susceptibility to change arising from the Proposed Scheme. **Year 1:** Landscape character would be directly affected by the legacy loss of agricultural land, hedgerows and small woodland copses. There would be changes in landform, and introduction of elements uncharacteristic of the gently rolling landscape, such as landscape earthworks. Whilst these uncharacteristic landscape features would help to screen views of the Proposed Scheme, they would also restrict some long-distance views across the southern part of the LCA, and detract from its open character. The realignment of local roads would create additional permanent changes to the landscape pattern. South of M42 junction 11, the Proposed Scheme alignment close to the existing M42 corridor would create a more prominent wide transport corridor, which would influence landscape character. To the north of M42 junction 11, the Proposed Scheme would be aligned further from the highway corridor, thereby adding a second transport corridor through the landscape, reducing tranquillity. There would be additional severance and loss of connectivity in the LCA. Vertical elements (such as overhead line equipment) and moving trains, noticeable on embankments, at ground level or in shallow cutting, would detract from the rural character of the landscape. There would therefore be a medium magnitude of change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
Year 15: Landscape mitigation planting would partially integrate earthworks and structures into the landscape, and provide visual screening. Changes to the landscape pattern and landform would remain. The magnitude of change would therefore remain as medium with moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
River Mease Floodplain Farmland	**Medium susceptibility and sensitivity**
Susceptibility to change: The open character of the landscape, the presence of the River Mease SAC and SSSI, and rural qualities of the landscape albeit with urban influences, impart a medium susceptibility to change arising from the Proposed Scheme. **Year 1:** The River Mease viaduct and Appleby Magna embankment No.2 would introduce uncharacteristically large scale, prominent structure and landform changes in the relatively flat floodplain. Changes to the character of the LCA would be widespread, despite occupying only a small proportion of the area. Associated infrastructure such as noise fences and overhead line equipment, would combine with those of the A42, detracting from the rural character of the LCA. Train movements and noise would affect tranquillity, albeit already influenced by the A42. There would therefore be a medium magnitude of change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
Year 15: Landscape mitigation planting would partially integrate structures into the landscape. Wetland habitat planting would enhance the River Mease corridor, but the presence of the operational railway	**Level of effect:** Moderate adverse

including the prominent viaduct, would remain as uncharacteristic landscape features. The magnitude of change would therefore remain as medium with moderate adverse effect.	(significant)
Measham	**Medium susceptibility and sensitivity**
Susceptibility to change: The mix of qualities of the urban landscape, including the distinctive historic centre, widespread post-war housing, and the low scenic quality of the industrial fringe impart a medium susceptibility to change arising from the Proposed Scheme. **Year 1:** The River Mease viaduct would be a prominent feature somewhat in keeping with the large scale of the Plastic Omnium factory works where it would cross the industrial fringe of the LCA, but in proximity to housing on Burton Road/ Dysons Close it would form a prominent and uncharacteristic element in the urban area. The A42 Measham cutting would create changes in landform, and result in the loss of residential properties at Amersham Way. The loss of the belt of woodland between the A42 and Amersham Way would result in a more open landscape at the northern end of the residential development, changing the enclosed character of the development. The prominent viaduct, train movement and associated elements would create permanent changes to the landscape. There would therefore be a medium magnitude of change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
Year 15: There would not be any change in comparison to operation year 1. The magnitude of change would therefore remain as medium with moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
Oakthorpe Village Coalfield Farmlands	**Medium susceptibility and sensitivity**
Susceptibility to change: The undulating landscape, the presence of publicly accessible woodlands associated with the National Forest, and rural qualities of the landscape have a medium susceptibility to change arising from the Proposed Scheme. **Year 1:** The removal of characteristic features of areas of woodland (including recent National Forest planting), agricultural land uses, and hedgerow field boundaries would directly impact the landscape. The Proposed Scheme would change landform being generally in shallow cutting through the LCA, with a short section of embankment to the north of Measham and a deeper cutting at the northern end of the LCA as it passes through Willesley Wood Side. Landscape earthworks integrated into the undulating landform would partially screen the deep cutting, but it would remain a more prominent feature. The combined transport corridor would be wider and more prominent in the landscape with the realigned section of the A42closer to the village of Oakthorpe; the Proposed Scheme further detracting from existing tranquillity. Vertical elements such as overhead line equipment would add strong linear and industrial elements that are uncharacteristic of the existing rural landscape character. Substantial woodland planting would have no mitigation effect in the first year. The deep cutting and realigned A42, would create permanent changes. Effects on landscape character would be limited from the west by the falling landform and from the east by retained woodland. Due to resulting variance with the existing landscape character in the eastern part of the LCA, there would therefore be a medium magnitude of change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
Year 15: Substantial areas of mitigation planting on the eastern side of the Proposed Scheme, the western side of the realigned A42, and on the land between the Proposed Scheme and the A42 would replace lost woodland and augment retained vegetation. Mitigation planting would help to integrate structures and landform changes into the landscape, and would provide enclosure of the combined transport corridor. The magnitude of change would therefore be reduced to low, with moderate adverse effect.	**Level of effect:** Moderate adverse (significant)

Packington Village Farmlands	**Medium susceptibility and sensitivity**
Susceptibility to change: The open rolling landscape, Packington Conservation Area, and the rural qualities of the landscape impart a medium susceptibility to change arising from the Proposed Scheme. **Year 1:** Large-scale earthworks of Willesley Wood Side cutting, Measham Road Packington cutting, and the shallower Ashby-de-la-Zouch cutting No. 1 would create prominent changes to the rolling landform. Removal of characteristic features of agricultural land and hedgerow boundaries would directly impact the landscape. Vegetation loss would result in a more open landscape, open up views of the A42 and increase traffic prominence. Introduction of uncharacteristic features such as the prominent Gilwiskaw Brook viaduct and other new infrastructure elements (e.g. balancing ponds) would have a permanent impact on the rural landscape west of Packington and the setting of Packington Conservation Area. Noise fences and overhead line equipment added to infrastructure features of the A42 would change the predominantly rural character of the LCA. Train movement and associated noise would affect the tranquillity of the rural landscape, already influenced by the A42. Proposed mitigation planting would not provide screening or landscape integration at this stage. There would therefore be a medium magnitude of change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
Year 15: Mitigation planting and hedgerow planting would only partially integrate structures into the landscape. The magnitude of change would therefore remain as medium with moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
Packington Village Wooded Farmlands	**Medium susceptibility and sensitivity**
Susceptibility to change: The undulating landscape, woodland associated with the National Forest, and rural qualities of the landscape impart a medium susceptibility to change from the Proposed Scheme. **Year 1:** Prominent changes to the undulating landform would result from the introduction of cuttings and loss of characteristic features (agricultural land, hedgerows and limited areas of woodland). Settlement character would change at New Packington. Three overbridges (Ashby Road, Leicester Road and Leicester to Burton Railway) would add prominent, uncharacteristic features to the landscape. Other elements (noise fences and overhead line equipment) would add to infrastructure of the A42, changing the predominantly rural characteristics. Train movement and noise would affect the tranquillity of the rural landscape, already influenced by the A42. There would be additional severance of the LCA, and areas of islanded land where the landscape would be heavily dominated by the adjoining transport corridors. Proposed mitigation planting would not have established at year 1 and would not provide screening or landscape integration at this stage. There would therefore be a medium magnitude of change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
Year 15: Mitigation planting in the islanded land would replace woodland lost during construction, provide a buffer between the two transport corridors, and partially screen changes in landform. It would help integrate structures into the landscape, but cuttings would remain intrusive in the rural landscape. The magnitude of change would therefore remain as medium with moderate adverse effect.	**Level of effect:** Moderate adverse (significant)

Visual assessment

Introduction

11.5.6 The following section describes the likely significant effects on visual receptors during operation year 1 and year 15. Effects at operation year 30 will be reported in the formal ES. The assessment has been undertaken for the winter period, in line with best practice guidance, to ensure a robust assessment. However, in some cases, visibility of the operational Proposed Scheme may be reduced during summer when vegetation, if present in a view, would be in leaf.

11.5.7 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.

11.5.8 Table 29 identifies the locations where the operation of the Proposed Scheme would potentially result in significant effects. These locations are shown in Map Series LV-04 in the Volume 2: LA03 Map Book.

Table 29: Operation phase significant visual effects

View west from Dingle Lane (Leicestershire Bridleway Q19/3), Appleby Parva (VP 359-03-001) (Map Number LV-04-359)	**Medium-high sensitivity visual receptors**
Year 1 – winter and summer: Bridleway users would experience a noticeable alteration to existing views from this location as a result of the Proposed Scheme, in particular with the presence of the Appleby Parva embankment and the Appleby Parva cutting. Landscape mitigation earthworks along the Appleby Parva embankment would screen middle distance views of the Proposed Scheme. There would be a noticeable change to key characteristics of the view at both winter and summer of Year 1. There would therefore be a medium magnitude of visual change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
Year 15 – summer: Due to the maturing vegetation present in the view, effects would reduce to non-significant by year 15.	**Level of effect:** Non-significant
View north from Dingle Lane (Leicestershire Bridleway Q19/3), Appleby Parva (VP 359-03-002) (Map Number LV-04-359)	**Medium-high sensitivity visual receptors**
Year 1 – winter and summer: At both winter and summer of Year 1, users of the bridleway would experience some changes to the medium and long-distance views as a result of the Proposed Scheme. Appleby Magna cutting and Appleby Magna embankment would be complemented with 5m high landscape earthworks as mitigation, but the overhead line equipment and the movement of trains would still be partially visible against the skyline and would result in an alteration of key characteristics of the view, although the M42 would be screened by the new infrastructure. Landscape mitigation planting within the land required for construction would not contribute to any visual integration or enclosure at this stage. There would therefore be a medium magnitude of visual change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
Year 15 – summer: Due to the maturing vegetation present in the view, effects would reduce to non-significant by year 15.	**Level of effect:** Non-significant

View north-west from residences on the A444 Atherstone Road adjacent to Appleby House, Appleby Parva **(VP 359-02-004) (Map Number LV-04-359)**	**High sensitivity visual receptors**
Year 1 – winter and summer: Residents of Appleby Parva and users of the A444 Atherstone Road would have views to a section of the Proposed Scheme which would be partially visible in the middle distance of the view. Views of trains would be largely screened by the landscape earthworks along the eastern edge of the Proposed Scheme. However, the upper parts of trains and the overhead line equipment would remain visible above the top of the earthworks. The landscape earthworks would appear close to the skyline, but would also have the benefit of screening existing views of traffic on the A42. There would be noticeable changes to the view at both winter and summer of Year 1. There would therefore be a medium magnitude of change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
Year 15 - summer: Due to the maturing vegetation present in the view, effects would reduce to non-significant by year 15.	**Level of effect:** Non-significant
View north-west from residences on Tamworth Road, south of Measham **(VP 360-02-004) (Map Number LV-04-360)**	**High sensitivity visual receptors**
Year 1 – winter and summer: The Proposed Scheme would run on Appleby Magna embankment No.2 and River Mease viaduct and would be noticeable in the middle distance of the view, seen beyond the buildings of Side Hollows Farm. The Proposed Scheme would create a prominent, uncharacteristic feature extending across part of the view. The existing landform would help to screen views of the Proposed Scheme towards the south. The proposed mitigation planting would not contribute to any visual screening, integration or enclosure at this stage. At both winter and summer of Year 1 there would be a noticeable change to key characteristics of the view. There would therefore be a medium magnitude of visual change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
Year 15 – summer: Although mitigation planting would partially filter views of the Proposed Scheme and associated features, the River Mease Viaduct would remain as a visually prominent component within views. There would therefore be a medium magnitude of visual change and remaining moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
View north-west from Tamworth Road, south of Measham **(VP 360-04-005) (Map Number LV-04-360)**	**Low sensitivity visual receptors**
Year 1 – winter and summer: The Proposed Scheme would introduce the new prominent, uncharacteristic feature of the River Mease viaduct that would be continuously highly visible over part of the view. The proposed mitigation planting would not contribute to any visual screening, integration or enclosure at this stage but the retention of existing vegetation cover on the outside edge of the construction area would provide continued screening. At both winter and summer of Year 1there would be a noticeable change to key characteristics of the view. There would therefore be a medium magnitude of visual change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
Year 15 – summer: Due to the maturing vegetation present in the view, effects would reduce to non-significant by year 15.	**Level of effect:** Non-significant
View north-west from Huntingdon Way, Measham	**Low sensitivity visual**

(VP 360-04-007) (Map Number LV-04-360)	**receptors**
Year 1 – winter and summer: The presence of the River Mease viaduct would alter the appearance of the landscape and would represent a new prominent, uncharacteristic feature that would extend across the existing view at both winter and summer of Year 1, for people travelling along Huntingdon Way and employees within the industrial estate. There would therefore be a high magnitude of visual change and moderate adverse visual effect.	**Level of effect**: Moderate adverse (significant)
Year 15 – summer: The view would remain similar to operation at year 1. Neither vegetation nor other elements would screen the viaduct, partly due to the landform. There would therefore remain a high magnitude of visual change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
View west from residences and public open space/ play area on Dysons Close, Measham **(VP 360-02-008) (Map Number LV-04-360)**	**High sensitivity visual receptors**
Year 1 – winter and summer: Residents and users of Dysons Close would have close to medium distance views of the Proposed Scheme. The River Mease viaduct would be the most prominent feature within the views from this location both in the summer and the winter. There would be a noticeable change to key characteristics of the view at both winter and summer of Year 1. There would therefore be a medium magnitude of visual change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
Year 15 – summer: The view would remain the same. There would therefore remain a medium magnitude of visual change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
View south from Repton Road, Measham **(VP 360-04-009) (Map Number LV-04-360)**	**Low sensitivity visual receptors**
Year 1 – winter and summer: At both winter and summer of Year 1, people travelling and working within the Westminster Industrial Estate would experience substantial changes in the views as a result of the Proposed Scheme. The River Mease viaduct, Appleby Magna embankment No.2, movement of trains and overhead line equipment would appear prominent in close distance views, which would not be screened due to the removal of vegetation during construction. There would therefore be high magnitude of visual change and moderate adverse effect.	**Level of effect:** Moderate adverse (significant)
Year 15 – summer: The view would remain similar to operation year 1. The magnitude of visual change would therefore remain high with moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
View north-west from residences on Chapel Street, Measham **(VP 361-02-003) (Map Number LV-04-361)**	**High sensitivity visual receptors**
Year 1 – winter and summer: At both winter and summer of Year 1, people living in Chapel Street would experience noticeable changes in the view. The Proposed Scheme would run in a shallow cutting that would partially screen the trains, although overhead line equipment would be visible above the top of the cutting, appearing against the skyline for most of the view. Vegetation would have been removed from within the land required for construction opening up views for the residents of Chapel Street. Mitigation planting would not contribute to visual screening at this	**Level of effect:** Moderate adverse (significant)

stage. There would therefore be a medium magnitude of visual change and moderate adverse visual effect.	
Year 15 – summer: Due to the maturing vegetation present in the view, effects would reduce to non-significant by year 15.	**Level of effect:** Non-significant
View north-west from residences and village centre car park off High Street, Measham **(VP 361-02-001) (Map Number LV-04-361)**	**Residents: High sensitivity visual receptors**
Year 1 – winter and summer: The Proposed Scheme would run on Measham embankment (up to 5m above the ground level at its highest point) and in the A42 Measham cutting, which would not be deep enough to screen the infrastructure (up to 1m below ground level at its deepest point in this section). Therefore, movements of trains and overhead line equipment would be noticeable, partially screened by intervening vegetation in the foreground and middle distance. The realignment of the A42 would not be perceptible as it would run in the cutting behind the Proposed Scheme. At both winter and summer of Year 1 mitigation planting would not contribute to any visual screening. There would therefore be a medium magnitude of visual change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
Year 15 – summer: Due to the maturing vegetation present in the view, effects would reduce to non-significant by year 15.	**Level of effect:** Non-significant
View north-west from Leicestershire Footpath O68/4, west of Packington **(VP 362-03-008) (Map Number LV-04-362)**	**Medium-high sensitivity visual receptors**
Year 1 – winter and summer: At both winter and summer of Year 1, footpath users would experience noticeable changes in middle distance views as result of the Proposed Scheme. The Proposed Scheme would run in the Measham Road Packington cutting, which would not be deep enough to screen the infrastructure (up to 4m below ground level at its deepest point in this section). Therefore, movement of trains and overhead line equipment would be partially visible. There would therefore be a medium magnitude of visual change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
Year 15 – summer: Due to the maturing vegetation present in the view, effects would reduce to non-significant by year 15.	**Level of effect:** Non-significant
View north-west from Leicestershire Footpath O72/1, north-east of Packington **(VP 363-03-006) (Map Number LV-04-363)**	**Medium-high sensitivity visual receptors**
Year 1 – winter and summer: The Proposed Scheme would run in Ashby-De-La-Zouch cutting No.1, which would not be deep enough to screen the infrastructure (up to 5m below ground level at its deepest point in this section). Ashby Road south overbridge, overhead line equipment and other associated elements would be visible in the middle distance. A balancing pond would be prominent in the foreground of the view. At both winter and summer of Year 1 mitigation planting would not contribute to any visual integration. There would therefore be a medium magnitude of visual change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
Year 15 – summer: Due to the maturing vegetation present in the view, effects would reduce to non-significant by year 15.	**Level of effect:** Non-significant
View north-west from residences on Leicester Road, New Packington	**High sensitivity visual receptors**

(VP 363-02-012) (Map Number LV-04-363)	
Year 1 – winter and summer: At both winter and summer of Year 1, the Proposed Scheme would run in Ashby-De-La-Zouch cutting No.1, which would be crossed by Leicester Road overbridge. The tops of trains and overhead line equipment would be visible where the cutting would not be deep enough to provide screening (up to 5m below ground level at its shallowest point in this section). Planting along the Proposed Scheme in long-distance views and wetland habitat creation (ecological mitigation) to near distance views would not contribute to any visual integration at this stage. There would therefore be a medium magnitude of visual change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
Year 15 – summer: Due to the maturing vegetation present in the view, effects would reduce to non-significant by year 15.	**Level of effect:** Non-significant
View north-west from residences on Leicester Road, New Packington **(VP 363-02-013) (Map Number LV-04-363)**	**High sensitivity visual receptors**
Year 1 – winter and summer: At both winter and summer of Year 1, the Proposed Scheme would run in Ashby-De-La-Zouch cutting No.1, which would be crossed by Leicester Road overbridge. The tops of trains and overhead line equipment would be visible in the part of the view where the cutting would not be deep enough to screen them (up to 5m below ground level at its shallowest point in this section). The construction area would be planted and restored, although mitigation planting would not contribute to any visual integration at this stage. There would therefore be a medium magnitude of visual change and moderate adverse visual effect.	**Level of effect:** Moderate adverse (significant)
Year 15 – summer: Due to the maturing vegetation present in the view, effects would reduce to non-significant by year 15.	**Level of effect:** Non-significant

Other mitigation measures

11.5.9 The permanent effects of the Proposed Scheme on landscape and visual receptors would be reduced through integration of the measures described in this section. Effects in Year 1 may also be further reduced through establishing planting early or in advance of the main construction programme. Other features such as additional earthworks, planting or greenspace, 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

11.5.10 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 effects in relation to six LCAs;
- moderate adverse visual effects at two residential viewpoint locations; and
- moderate adverse visual effects at two road user locations.

Monitoring

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

11.5.12 There are no area-specific requirements for monitoring landscape and visual mitigation during the operation of the Proposed Scheme in the Appleby Parva to Ashby-de-la-Zouch 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 Appleby Parva to Ashby-de-la-Zouch area. The assessment considers existing businesses, community organisations, local employment and local economies, including planned growth and development.

12.1.2 Engagement with North West Leicestershire District Council (NWLDC) 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, Section 12.

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: LA03 Map Book.

12.2 Scope, assumptions and limitations

12.2.1 The scope, assumptions and limitations for the socio-economics assessment are set out in Volume 1, Section 8 and the Scope and Methodology Report (SMR)[100].

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

12.3 Environmental baseline

Existing baseline

Study area description

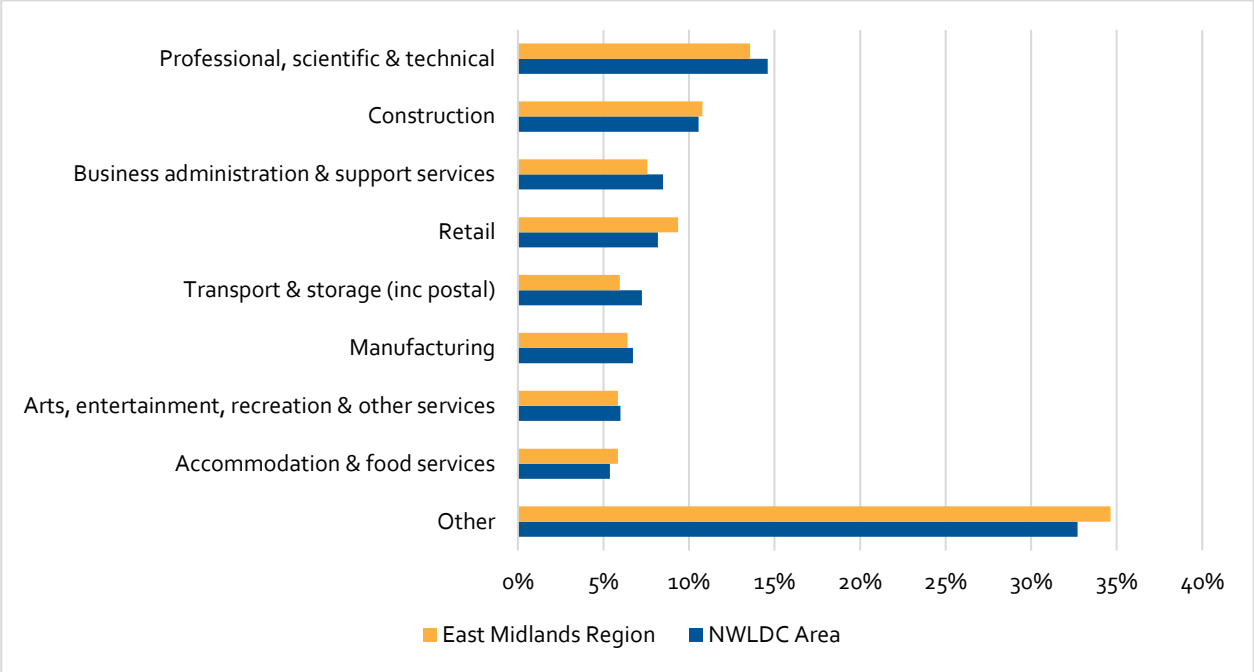
12.3.1 The following provides a brief overview of employment, economic structure, labour market and business premises availability within the Appleby Parva to Ashby-de-la-Zouch area. It lies within the administrative area of NWLDC. It also falls within the Leicester and Leicestershire Local Enterprise Partnership (LEP) area[101] and East Midlands region.

[100] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report
[101] Leicester and Leicestershire Enterprise Partnership, (2014), *Strategic Economic Plan 2014*

Business and labour market

12.3.2 Within the NWLDC area there is a wide spread of business types reflecting a diverse range of commercial activities. The professional, scientific and technical sector accounts for the largest proportion of businesses (15%), with construction the second largest (11%), followed by business administration and support services (9%). This is shown in Figure 9. For comparison within the East Midlands region, the largest sectors were professional, scientific and technical (14%), followed by construction (11%) and retail (9%)[102].

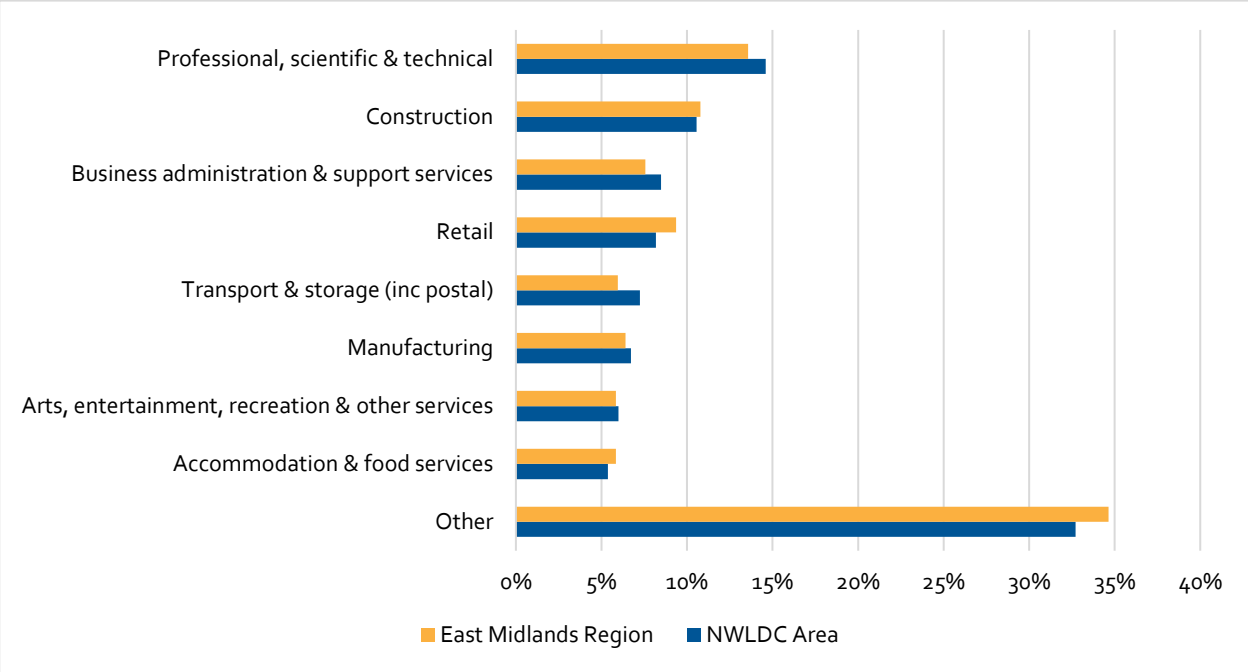
Figure 9: Business sector composition in NWLDC area and the East Midlands region[103]



12.3.3 In 2016[104], approximately 57,000 people worked in the NWLDC area. 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 NWLDC area were: transportation and storage (14%); manufacturing (12%); professional, scientific and technical activities (11%); business administration and support (9%); and accommodation and food services (7%). These compare with the top five sectors for the East Midlands region, which were: manufacturing (13%); health (13%); retail (10%); business administration and support (9%); and education (8%). This is shown in Figure 10Figure 10 [105].

[102] Office for National Statistics; UK Business count – Local Units 2016. Available online at: https://www.nomisweb.co.uk
[103] "Other" includes: Information and communication; Wholesale; Health; Agriculture, forestry and fishing; Motor trades; Property; Education; Financial and insurance; Public administration and defence; Mining, quarrying and utilities.
[104] Office for National Statistics; 2016; Business Register and Employment Survey. Available online at: http://www.nomisweb.co.uk, This number includes both residents and non-residents of NWLDC who work within its boundaries
[105] Office for National Statistics; 2016; Business Register and Employment Survey. Available online at: http://www.nomisweb.co.uk, This number includes both residents and non-residents of NWLDC who work within its boundaries

Figure 10: Employment by industrial sector in the NWLDC area and the East Midlands region



12.3.4 According to the Annual Population Survey (2016)[106], the employment rate[107] within the NWLDC area was 77% (45,500 people), which is more than that recorded for both the East Midlands region (75%) and England (74%). In 2016, unemployment[108] in the NWLDC area was 4.3%, which was lower than the East Midlands region (4.4%) and England (5%).

12.3.5 According to the Annual Population Survey (2016)[109], 39.8% of NWLDC residents aged 16-64 were qualified to National Vocational Qualification Level 4 (NVQ4)[110] and above, compared to 31.3% in the East Midlands and 38% in England, while 4.9% of residents had no qualifications, which was lower than that recorded both for East Midlands region (7.5%) and England (7.8%).

Property

12.3.6 A review of employment land in 2012[111] identified a need for 7.4ha per year to 2026 for B1c/B2[112] industrial land (3.7ha of which is new land developed), 20.2ha per year to 2026 for B8[113] warehousing (of which 15.1ha is new land developed) and 19,100m² of

[106] Annual Population Survey, (2016), NOMIS; Available online at: http://www.nomisweb.co.uk
[107] The proportion of working age (16-64 year olds) residents that is in employment.
[108] 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.
[109] Annual Population Survey, (2016), NOMIS; Available online at: http://www.nomisweb.co.uk
[110] NVQ4 suggests management experience, Licentiateship (LCGI), Higher Professional Diploma, SVQ/NVQ level 4, Level 4 vocational awards, undergraduate degree, Full technical certificate, BTEC HND/HNC; as defined by City & Guilds; Available online at: https://www.cityandguilds.com/qualifications-and-apprenticeships/qualifications-explained/qualification-comparisons
[111] The Leicester and Leicestershire Employment Land Study, (2012), Available online at: https://www.leicester.gov.uk/media/177978/leicestershire-employment-land-review-2012.pdf
[112] B1C is Light Industrial Land Use, B2 is Industrial and Manufacturing Land Use as defined under Employment Density Guidance, HCA (2015)
[113] B8 Storage and Distribution Land Use as defined under Employment Density Guidance, HCA (2015)

B1a/b[114] office floorspace (of which 9,600m² is new land developed) in the NWLDC area, and that there has been an historic shortfall in the provision of employment land up until 2011.

12.3.7 The average vacancy rate for industrial and warehousing property in the NWLDC area will be reported in the formal ES[115].

12.3.8 Based upon the latest available data from the Estates Gazette (October 2017[116]) there is 33,000 m² of office space and 984,000m² of industrial space available in the NWLDC area.

12.4 Effects arising during construction

Avoidance and mitigation measures

12.4.1 The draft CoCP[117] includes a range of provisions that would help mitigate socio-economic effects associated with construction within this area, including:

- reducing nuisance through sensitive layout of construction sites (Section 5);
- consulting businesses located close to hoardings on the design, materials used and construction of the hoarding, to reduce impacts on access to and visibility of their premises (Section 12);
- applying best practicable means (BPM) during construction works to reduce noise (including vibration) at sensitive receptors (including local businesses) (Section 13);
- monitor and manage flood risk and other extreme weather events that may affect socio-economic resources during construction (Section 13);
- site specific traffic management measures including requirements relating to the movement of traffic from business and commercial operators of road vehicles, including goods vehicles (Section 14); and
- maintaining access to businesses for the duration of construction works where reasonably practicable (Section 14).

Assessment of impacts and effects

12.4.2 The proposed construction works are assessed for socio-economic effects in relation to:

- premises demolished with their occupants and employees needing to relocate to allow for construction of the Proposed Scheme;

[114] B1a is Office Land Use and B1b is R&D Space Land Use as defined under Employment Density Guidance, HCA (2015)
[115] Data supplied to date gave a spuriously high percentage of stock availability due to a timing issue in so far as property offer data being based on the current offers shown on EGi system at the point that the data was interrogated, whilst stock data is historic and typically lags by a couple of years. As such if a large amount of new space is marketed it can appear as a large % in relation to the historic stock figure taken from the latest release from VOA data. The data has therefore been omitted at this stage as it is not considered representative.
[116] Based on marketed space identified from Estates Gazette data (EGi) (March 2018). Available online at: https://www.egi.co.uk/Property/Availability/
[117] Supporting document: Draft Code of Construction Practice

- in-combination effects (e.g. air quality, noise, vibration, construction traffic and visual impacts) and isolation of an area, which could affect business operations, both will be reported in the formal ES. Any resulting effects on employment will be reported at a route-wide level (see Volume 3: Route-wide effects); and
- potential employment opportunities arising from construction in the local area (including in adjacent community areas).

Construction employment

12.4.3 It is currently anticipated that there would be three main construction compounds namely Atherstone Road, B4116 and A42 junction 13, and 11 satellite compounds in the Appleby Parva to Ashby-de-la-Zouch area. These sites could result in the creation of up to 3,159 person years of construction employment opportunities[118], broadly equivalent to 316 full-time jobs[119], which, depending on skill levels required and the skills of local people, are potentially accessible to residents in the locality and to others living further afield. The impact of the direct construction employment creation has been considered as part of the route-wide assessment (see Volume 3: Route-wide effects).

12.4.4 Direct construction employment could also lead to opportunities for local businesses to form part of the supply chain for the project or to benefit from expenditure of construction workers. The impact of the indirect construction employment creation has been considered as part of the route-wide assessment (see Volume 3: Route-wide effects).

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

Permanent effects

Businesses

12.4.6 Businesses directly affected, comprising those that lie within land required for the Proposed Scheme, are reported in groups, where possible, to form defined resources based on their location and operational characteristics. A group could contain either one or a number of businesses reflecting the fact that a building may have more than one occupier or that similar businesses and resources are clustered together.

12.4.7 Overall, 29 business accommodation units or sites in the study area would experience direct impacts as a result of the Proposed Scheme. These 29 units or sites, together, form 25 defined resources and provide a total of approximately 170 jobs. These include:

- Westminster Industrial Estate (17 business units);
- Appleby Magna Service Area (two business units);

[118] Construction labour is reported in construction person years, where one construction person year represents the work done by one person in a year composed of a standard number of working days.
[119] Based on the convention that 10 employment years is equivalent to one full time equivalent job.

- Treetops Farm, Measham Road (one business unit);
- Park Farm, Willesley Woodside (two business units);
- Beech Farm House, Ashby Road (one business unit);
- Meridian, Leicester Road (one business unit); and
- Sandwich Shop, Ashby Road.

12.4.8 One of the resources that would experience direct impacts would be subject to potentially significant effects on business activities and employment as shown in Table 30.

Table 30: Resources that would potentially experience significant direct effects

Resource	Description of business activity
Westminster Industrial Estate	A cluster of 17 businesses across a section of the industrial estate including those on the Huntingdon Court section of the estate would be affected. These undertake manufacturing and light industrial work, as well as a catering business and training centre; there are a total of 57 jobs estimated across these businesses.

Impact magnitude

12.4.9 The magnitude of impact focuses on the number of jobs that would be affected by the Proposed Scheme, either through displacement or possible job loss. It also considers the implications of this impact in relation to the scale of economic activity and opportunity in the area.

Sensitivity

12.4.10 The sensitivity of resources considers the following:

- availability of alternative, suitable premises;
- size of the local labour market;
- skill levels and qualifications of local people; and
- levels of unemployment.

Significance of effects

12.4.11 Taking account of the sensitivity of the resource and the magnitude of impact, it is currently anticipated that the significance of the resultant effects would be as set out in Table 31. It should be noted that a precautionary approach has been taken in this assessment as outlined in Section 1.2 and it may change prior to finalising the formal ES.

Table 31: Significance of effects on resources

Resource	Impact magnitude	Sensitivity	Significance of effect
Westminster Industrial Estate	High	Low	Moderate adverse –high magnitude and low sensitivity - 57 jobs across 16 businesses would be lost or displaced.

12.4.12 The construction of the Proposed Scheme would require the demolition of business premises on the Westminster Industrial Estate.

12.4.13 The Westminster Industrial Estate comprises approximately 52 businesses, 15 of which would be affected by demolition, with an additional two businesses which would affected by the construction of the Proposed Scheme. The premises have been identified as light industrial units. It is not considered that the operator(s) would have difficulty in finding suitable alternative premises of equivalent scale, although there would be a number of businesses needing to relocate. The effect on Westminster Industrial Estate, and employees of the businesses on the site, is assessed to be moderate adverse, and therefore, significant.

12.4.14 Across all of the employment areas reviewed on land required for the construction of the Proposed Scheme, it is currently anticipated that an estimated 170 jobs[120] would either be displaced or possibly lost within the Appleby Parva to Ashby-de-la-Zouch area. There is a reasonable probability that businesses would be able to relocate to places that would still be accessible to residents within the travel to work areas due to the general availability of vacant premises. However, there may be cases where alternative locations are problematic and the businesses may be unable to relocate on a like-for-like basis within the area. The impact on the local economy from the relocation or loss of jobs is considered to be relatively modest in the context of the total number of people employed in the NWLDC area (approximately 57,000 jobs) and the scale of economic activity and opportunity in the area. The resulting effects on employment are reported in aggregate at a route-wide level (see Volume 3, Route-wide effects).

Other mitigation measures

12.4.15 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.

12.4.16 The construction of the Proposed Scheme offers considerable opportunities to businesses and residents along the route of the Proposed Scheme in terms of supplying goods and services and obtaining employment. HS2 Ltd at this stage assumes that it would, therefore, adopt a policy to work with its suppliers to build a skilled workforce that promotes further economic growth across the UK as it has done on Phases One and 2a.

Summary of likely residual significant effects

12.4.17 Any likely residual significant socio-economic effects will be reported in the formal ES.

[120] Employment within businesses has been estimated through a combination of sources, for example, surveys of businesses, the Experian employment dataset, employment floor space and the Homes and Communities Agency (HCA) Employment Densities Guide 3rd Edition (2015). The estimate is calculated using standard employment density ratios and estimates of floor areas and may vary significantly from actual employment at the sites.

12.5 Effects arising from operation

Avoidance and mitigation measures

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

Assessment of impacts and effects

Resources with direct effects

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

In-combination effects

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

Operational employment

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

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

Other mitigation measures

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

Summary of likely residual significant effects

12.5.7 Any likely residual significant socio-economic effects will be reported in the formal ES.

Monitoring

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

12.5.9 There are no area-specific requirements for monitoring socio-economic effects during the operation of the Proposed Scheme in the Appleby Parva to Ashby-de-la-Zouch 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 Appleby Parva to Ashby-de-la-Zouch area on:

- 'residential receptors'; people, primarily where they live, in terms of individual dwellings and on a wider community basis including any shared community open areas[121]; and
- 'non-residential receptors'[122] such as:
  - community facilities including schools, hospitals, places of worship and 'quiet areas'[123]; and
  - commercial properties such as hotels.

13.1.2 The methodology for the assessment of likely significant noise and vibration effects was developed in alignment with Government noise policy[124], planning policy, planning practice guidance on noise (PPGN)[125] and EIA Regulations as described in the Scope and Methodology Report[126] (SMR).

13.1.3 Engagement has been undertaken with North West Leicestershire District Council (NWLDC) and Leicestershire County Council (LeCC) 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 Appleby Parva to Ashby-de-la-Zouch 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

[121] 'Shared community open areas' are those that the Planning Practice Guidance identifies may partially offset a noise effect experienced by residents at their dwellings and are either a) relatively quiet nearby external amenity spaces for sole use by a limited group of residents as part of the amenity of their dwellings or b) a relatively quiet external publicly accessible amenity space (e.g. park or local green space) that is nearby.
[122] Non-residential receptors with multiple uses would be assessed either based on the most noise sensitive use or would be subject to multiple assessments as appropriate.
[123] 'quiet areas' are defined as either Quiet Areas as identified under the Environmental Noise Regulations 2007 (as amended) or are resources which are prized for providing tranquillity as noted in the NPPF and are therefore designated as such under the relevant local plan or are designated under local plans or neighbourhood development plans as local green spaces.
[124] Noise Policy Statement for England (2015) Department for Environment, Food & Rural Affairs (Defra).
[125] Planning Practice Guidance – Noise (2014) Department for Communities and Local Government (DCLG). Available online at: https://www.gov.uk/guidance/noise--2
[126] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

(Map series SV-01), can be found in the Volume 2: LA03 Map Book. Map series SV-01 also presents key 'non-residential receptors'. These receptors will be reviewed and developed further to incorporate, where appropriate, consultation feedback and ongoing stakeholder engagement.

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

13.2 Scope, assumptions and limitations

13.2.1 The approach to assessing sound, noise and vibration and identifying envisaged mitigation is outlined in Volume 1, Section 8 and Section 9, and the SMR.

13.2.2 In this assessment 'sound' is used to describe the acoustic conditions that people experience as a part of their everyday lives. Noise is taken as unwanted sound and hence adverse effects are noise effects and mitigation is, for example, by noise barriers.

13.2.3 Effects can either be temporary from construction or permanent from the operation of the Proposed Scheme. These effects may be direct, resulting from the construction or operation of the Proposed Scheme, and/or indirect, resulting from changes in traffic patterns on existing roads or railways that result from the construction or operation of the Proposed Scheme.

13.2.4 The effects of construction noise and vibration are assessed qualitatively, based on construction compound locations, construction routes, initial construction estimates and professional judgement. No quantitative assessment has been undertaken for the construction of the Proposed Scheme at this stage. The quantitative assessment will be reported in the formal ES.

13.2.5 The effects on operational noise and vibration are assessed quantitatively based on forecast noise emission from the Proposed Scheme combined with outline baseline information and professional judgement. As baseline information is limited at this stage the quantitative assessment including a full baseline will be reported in the formal ES.

13.3 Environmental baseline

13.3.1 The SMR describes the three rounds of baseline data collection covering existing sources, modelling and by targeted monitoring. Baseline sound levels will be published in the formal ES.

13.3.2 The Appleby Parva to Ashby-de-la-Zouch area is predominantly rural in character, with agriculture being the main land use. Agricultural land is interspersed with woodland, villages and a scattering of isolated dwellings and farmsteads. The area also includes an industrial estate, the Westminster Industrial Estate, immediately to the south of Measham. 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 Several main roads contribute to the sound environment within the Appleby Parva to Ashby-de-la-Zouch area: the M42 up to junction 11 where it becomes the A42; the A444 Atherstone Road that connects Appleby Magna and Twycross; the A444 Acresford Road from the A42 junction 11 to Acresford; the A511 Ashby Road from Ashby-de-la-Zouch to Coalville; and the A512 Ashby Road that runs from Ashby-de-la-Zouch to Coleorton.

13.3.4 Sound levels close to these main transportation routes are high during the daytime and are generally lower at night. Sound levels decrease with increasing distance from the main transportation routes.

13.3.5 The effects of vibration at all receptors are being initially assessed using specific thresholds, below which receptors would not generally be adversely affected by vibration. Further information is provided in Volume 1, Section 8.

13.3.6 The baseline assessment presented in the formal ES will consider current sound levels and how these may change in the future. This will include any changes firstly due to national trends such as road traffic growth and the progressive electrification of road vehicles and secondly due to area specific changes caused either by local committed development and/or noise reduction provided in Important Areas identified in Defra's Noise Action Plans for Agglomerations[127], Roads[128] or Railways[129]. HS2 Ltd will engage with the Competent Authorities responsible for the relevant Important Areas. Map Series SV-01 (Volume 2: LA03 Map Book) shows any noise Important Areas in the Appleby Parva to Ashby-de-la-Zouch area.

13.4 Effects arising during construction

Assumptions and limitations

13.4.1 The construction arrangements that form the basis of the assessment are presented in Section 2.3 of this report, in Volume 1, Section 8 and in the draft Code of Construction Practice (CoCP)[130]. The assessment focuses on the initial identification of communities that may be affected by construction noise. The formal ES will include the assessment of likely significant effects from construction noise and/or vibration on individual receptors and communities.

13.4.2 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 CoCP (Section 13), which are:

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

- 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 receptors131.
- as part of BPM, mitigation measures are applied in the following order:
  - noise and vibration control at source: for example, the selection of quiet and low vibration equipment, review of construction methodology to consider quieter methods, location of equipment on-site, control of working hours, the provision of acoustic enclosures and the use of less intrusive alarms, such as broadband vehicle reversing warnings;
  - screening: for example, local screening of equipment or perimeter hoarding or the use of temporary stockpiles; and
  - where, despite the implementation of BPM, the noise exposure exceeds the criteria defined in the draft CoCP, noise insulation or ultimately temporary re-housing would be offered at qualifying properties.
- lead contractors would seek to obtain prior consent from the relevant local authority under Section 61 of the CoPA for the proposed construction works. The consent application would set out BPM measures to minimise construction noise and vibration, including control of working hours, and provide a further assessment of construction noise and vibration, including confirmation of noise insulation/temporary re-housing provision.
- contractors would undertake and report such monitoring as is necessary to assure and demonstrate compliance with all noise and vibration commitments. Monitoring data would be provided regularly to, and be reviewed by, the nominated undertaker and made available to the local authorities.
- contractors would be required to comply with the terms of the draft CoCP and appropriate action would be taken by the nominated undertaker as required to ensure compliance.

13.4.4 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 temporary re-housing provided, before the start of the works predicted to exceed noise insulation or temporary re-housing criteria.

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

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: LA03 Map Book):

13.4.7 Appleby Parva, arising from construction activities such as cutting formation, embankment formation and landscape bund construction;

13.4.8 Appleby Magna, arising from construction activities such as cutting formation, embankment formation, overbridge construction, landscape bund construction, balancing pond construction, ecological pond construction and road realignment;

13.4.9 Measham , arising from construction activities such as demolition, cutting formation, road realignment (such as the realignment of the A42), embankment formation, viaduct construction, overbridge construction, landscape bund construction and balancing pond construction;

13.4.10 Oakthorpe, arising from construction activities such as demolition, cutting formation, road realignment (such as the realignment of the A42), embankment formation, viaduct construction, overbridge construction, landscape bund construction and balancing pond construction;

13.4.11 Packington, arising from construction activities such as cutting formation, embankment formation, landscape bund construction, balancing pond construction and overbridge construction;

13.4.12 Ashby-de-la-Zouch, arising from construction activities such as cutting formation and landscape bund construction; and

13.4.13 New Packington, arising from construction activities such as demolition, cutting formation, overbridge construction, landscape bund construction and ecological pond construction.

13.4.14 Map Series SV-01 (Volume 2: LA03 Map Book) shows key non-residential properties that have been identified within the study area as defined in the SMR. Of these, the following are likely to experience significant effects (to be confirmed in the formal ES):

- Appleby Park Hotel on the M42 junction 11;
- Oakthorpe Primary School in Oakthorpe; and
- Bethany Ministries in Packington.

13.4.15 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.

13.4.16 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:

- Austrey Road and the A444 Atherstone Road in Appleby Parva;

- Tamworth Road between Appleby Magna and Measham;
- Burton Road to the west of Huntingdon Way in Measham continuing towards Measham Road;
- New Street in Measham continuing along Ashby Road to the north of Measham first and to Measham Road towards Packington later and ending on Vicarage Lane in Packington; and
- Leicester Road in New Packington.

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

Other mitigation measures

13.4.18 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

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

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

13.5 Effects arising from operation

Assumptions and limitations

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 and 2.4 of this report and in Volume 1 (Sections 4 and 8) and the highest likely train flows, assuming the service pattern including Phase One and Phase Two services. The expected passenger service frequency for Phase 2b is described in Volume 1 (Section 4) and as outlined below for the Appleby Parva to Ashby-de-la-Zouch 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 will progressively increase to 10 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 at the southern end of the Appleby Parva to Ashby-de-la-Zouch area progressively reducing to around 280kph for all services at the northern end. This number of services is assumed to operate every hour from 07:00 to 21:00. The number of services will progressively decrease after 21:00 and the

last service will arrive at terminal stations by midnight. Further information is presented in Volume 1, Section 4.

Avoidance and mitigation measures

13.5.3 The development of the Proposed Scheme alignment has sought to reduce noise impact insofar as reasonably practicable.

13.5.4 Envisaged avoidance and mitigation measures that apply route-wide are described in Volume 1, Section 9.

Airborne noise

13.5.5 Through the procurement process for the trains and the track, the use of proven international technology will enable the railway to be quieter than implied by current minimum European standards. Details of operational train noise will be provided in the formal ES. This will include reduction of aerodynamic noise from the pantograph that otherwise would occur above 300kph (186mph) with current pantograph designs, drawing on proven technology in use in East Asia where reasonably practicable. Overall it is assumed that proven international technology would reduce noise emissions by approximately 3dB at 360kph (225mph) compared to the current minimum European standards[132].

13.5.6 The Proposed Scheme would incorporate noise barriers, in the form of either landscape earthworks and/or noise fence 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: LA03 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 criteria, to provide the same mitigation as defined in 'the NI Regulations' at residential buildings where[133] noise from the use of the Proposed Scheme measured outside a dwelling exceeds the

[132] Technical Specification for Interoperability (TSI) Noise – EU Commission Regulation No 1304/2014.
[133] Following Government's Planning Practice Guidance. Available online at: https://www.gov.uk/government/collections/planning-practice-guidance

Interim Target defined by the World Health Organization's (WHO) Night Noise Guidelines for Europe[134] or the maximum noise level criteria[135] defined in the SMR. Noise insulation is designed to avoid residents experiencing 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: LA03 Map Book) indicates the likely long-term daytime noise level (defined as the equivalent continuous sound level from 07:00 to 23:00 or LpAeq,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 LpAeq,night) from the Proposed Scheme would be approximately 10dB lower than the daytime sound level. The 50dB contour, therefore, indicates the distance from the Proposed Scheme at which the night time noise level would be 40dB. This contour represents where adverse noise effects may start to be observed during the day (with respect to annoyance) and night (with respect to sleep disturbance). With regard to sleep disturbance the assessment also takes account of the maximum noise levels generated by each train pass by as defined in the SMR.

13.5.12 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 design of 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: LA03 Map Book) and Map Series CT-06 (Volume 2: LA03 Map Book), would substantially reduce the potential airborne noise effects that would otherwise arise from the

[134] Night time Noise Guidelines for Europe (2010) World Health Organization (2010).
[135] Dependent on the number of train passes.

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:

- Measham: occupants of residential properties in the vicinity of Burton Road, Dysons Close and The Croft, located closest to the Proposed Scheme, identified as LA03-C01 on Map SV-01-357;
- Measham: occupants of residential properties in the vicinity of Amersham Way, Kelso Close, Rosebank View, Hart Drive, Orchard Way, Blackthorn Way, Hill Rise, Lime Avenue and New Street, located closest to the Proposed Scheme, identified as LA03-C02 on Map SV-01-357;
- Oakthorpe: occupants of residential properties in the vicinity of Measham Road and School Street, located closest to the Proposed Scheme, identified as LA03-C03 on Map SV-01-357;
- Packington: occupants of residential properties in the vicinity of Ashby Road, Mill Street, Hall Lane, Vicarage Lane, Home Croft Drive, High Street and Normanton Road, located closest to the Proposed Scheme, identified as LA03-C04 on Map SV-01-358;
- Ashby-de-la-Zouch: occupants of residential properties in the vicinity of Ashby Road, Chapmans Meadows, Upper Packington Road, The Gables, Rydal Gardens, Lowestwater Grove, Ulleswater Crescent, Thirlmere Gardens, Windermere Avenue, Derwent Gardens, Hastings Way, Windmill Close, Coniston Gardens, Ennerdale Gardens, Leicester Road and The Croft, located closest to the Proposed Scheme, identified as LA03-C05 on Map SV-01-359a; and
- New Packington: occupants of residential properties in the vicinity of Leicester Road, located closest to the Proposed Scheme, identified as LA03-C06 on Map SV-01-359a.

13.5.18 The initial assessment indicates that, on a precautionary basis, 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 level criteria set out in the SMR, at individual residential properties closest to the Proposed Scheme at:

- Beech House in Packington (identified on Map SV-01-358 in Volume 2: LA03 Map Book); and
- New Packington in the vicinity of Leicester Road (identified on Map SV-01-359a in Volume 2: LA03 Map Book).

13.5.19 Map Series SV-01 (Volume 2: LA03 Map Book) shows key non-residential properties for the assessment of operational airborne noise impacts in the formal ES. Of these, Appleby Park Hotel on the M42 junction 11 is likely to experience significant effects.

13.5.20 Further assessment work is being undertaken to identify operational noise 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 Appleby Parva to Ashby-de-la-Zouch area.

14.1.2 Engagement with Highways England and Leicestershire County Council (LeCC) 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: LA03 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, the Scope and Methodology Report (SMR) [136].

14.2.2 The study area for traffic and transport includes the settlements at Appleby Parva, Appleby Magna, Measham, Packington, No Man's Heath, Oakthorpe and Ashby-de-la-Zouch.

14.2.3 The study area also includes all roads potentially affected by the Proposed Scheme including the M42/A42 between junction 11 and junction 13, which is part of the strategic road network linking the East and West Midlands. Local roads include: the A444 Atherstone Road; the A511 Ashby Road; the A512 Ashby Road; the B4116 Measham Road; Rectory Lane; Tamworth Road; Huntingdon Way; Repton Road; Burton Road; New Street; Vicarage Lane; Ashby Road between Packington and Ashby-de-la-Zouch and Leicester Road.

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

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

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

14.3 Environmental baseline

Existing baseline

14.3.1 Existing conditions in the study area have been determined through site visits, traffic and transport surveys, liaison with LeCC and Highways England (including provision of information on public transport, public rights of way (PRoW) and accident data) and desktop analysis.

Surveys

14.3.2 Traffic surveys, comprising junction turning counts and queue surveys and automatic traffic counts, were undertaken in November 2017 and April 2018. These data have been supplemented by existing traffic data from other sources, including from LeCC and Highways England. 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% to 5%) between the observed peak hours and the periods 08:00-09:00 and 17:00-18:00, which are the periods when HS2 construction traffic movements and workforce arrivals and departures would have the maximum impact. Consequently, the 08:00-09:00 and 17:00-18:00 have been used as the assessment hours representing a reasonable worst case.

14.3.3 PRoW surveys were undertaken in August and November 2017 to establish their nature and usage by non-motorised users (pedestrians, cyclists and equestrians). The surveys included PRoW and roads that would cross the route of the Proposed Scheme, and any additional PRoW and roads that may be affected by the Proposed Scheme. The majority of the PRoW surveys were undertaken during the weekend, at times when recreational use is expected to be highest, but where routes are likely to be used for non-leisure uses such as commuting, surveys were undertaken on a weekday.

Strategic and local highway network

14.3.4 The strategic routes that pass through the area are the M42 and the A42 that lie to the west of the route of the Proposed Scheme. The strategic road network in and around Appleby Parva to Ashby-de-la-Zouch is busy at peak times and delays can be experienced.

14.3.5 The local roads that could be affected by the Proposed Scheme include: the A444 Atherstone Road; the A511 Ashby Road, the A512 Ashby Road; the B4116 Ashby Road; Rectory Lane; Tamworth Road; Huntingdon Way; Repton Road; Burton Road; New Street and Leicester Road. The local road network in this area generally operates well although some localised delays can be experienced, particularly at peak times.

14.3.6 Relevant accident data for the road network subject to assessment have been obtained from Department for Transport[137]. Data for the three year period (2014, 2015 and 2016) have been assessed and any identified clusters (i.e. where there are nine or more accidents in the three year period) have been examined.

[137] Department for Transport; Crashmap.co.uk. Available online at: www.crashmap.co.uk. CrashMap provides accident data for the UK.

14.3.7 Two accident clusters were identified within the Appleby Parva to Ashby-de-la-Zouch area:

- at the M42 junction 11 roundabout (nine accidents, but with no serious casualties or fatalities); and
- at the A42 junction 12 double roundabout (nine accidents, including two involving serious casualties).

14.3.8 The route of the Proposed Scheme would cross six roads with footways within the Appleby Parva to Ashby-de-la-Zouch area. These are: Huntingdon Way, Burton Road, New Street, the B4116 Measham Road, Ashby Road (linking Packington to Ashby-de-la-Zouch) and Leicester Road.

Parking and loading

14.3.9 There is no parking or loading identified in the Appleby Parva to Ashby-de-la-Zouch area that is expected to be impacted by the Proposed Scheme. Consequently, this topic is not considered further in this assessment.

Public transport network

14.3.10 One bus route operates on one road that is crossed by the route of the Proposed Scheme in the Appleby Parva to Ashby-de-la-Zouch area. There are also bus stops primarily located to serve the main built up areas. The bus route that could be affected by the Proposed Scheme is Route 19 (Ashby-de-la-Zouch - Measham - Swadlincote - Burton-upon-Trent) with stops located on Burton Road, Measham.

14.3.11 National and local rail services are accessible via Tamworth Station, which is located 12 km outside the Appleby Parva to Ashby-de-la-Zouch area. Tamworth Station provides access to national services to London, Crewe and Glasgow and local services to Birmingham, Lichfield and Nuneaton.

14.3.12 A freight-only railway line, the Leicester to Burton upon Trent line, passes through the Appleby Parva to Ashby-de-la-Zouch area, running east to west from Leicester to Burton-upon-Trent.

Non-motorised users

14.3.13 There are pedestrian footways adjacent to many of the roads in the built up areas of Appleby Magna, Measham, Ashby-de-le-Zouch and Packington. 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.

14.3.14 The route of the Proposed Scheme would cross the route of 22 PRoW within the Appleby Parva to Ashby-de-la-Zouch 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 there were fewer than 10 people a day recorded during the survey day on nine of the PRoW. The routes with the greatest usage recorded during the survey day were Leicestershire Bridleway O70/1 used by 198 pedestrians and 12 cyclists, Leicestershire

Bridleway P67/5 used by 71 pedestrians and two cyclists and Leicestershire Footpath P75/5 used by 58 pedestrians.

14.3.15 In the Appleby Parva to Ashby-de-la-Zouch area, the Ivanhoe Way, Ashby Woulds Heritage Trail and the National Cycle Network (NCN) Route 63 all follow the same section of multi-user trail (referred to singularly as NCN Route 63), which would be crossed by the route of the Proposed Scheme.

Waterways and canals

14.3.16 There are no navigable waterways in the Appleby Parva to Ashby-de-la-Zouch area. Consequently, this topic is not considered further in this assessment.

Air transport

14.3.17 There is no relevant air transport in the Appleby Parva to Ashby-de-la-Zouch area. Consequently, this topic is not considered further in this assessment.

14.4 Effects arising during construction

Avoidance and mitigation measures

14.4.1 The following measures are currently proposed to avoid or reduce effects on transport users:

- new highways (roads and PRoW) would be constructed and operational prior to the permanent closure of any existing highways, insofar as reasonably practicable;
- the majority of roads crossing the route of the Proposed Scheme would be maintained or locally diverted during construction to limit the need for diversion of traffic onto alternative routes;
- traffic management measures would be implemented to limit any disruption;
- road closures would be restricted to overnight and weekends, insofar as reasonably practicable;
- temporary alternative routes for PRoW would be provided during construction, insofar as reasonably practicable, where either the existing or final proposed route is not available;
- where reasonably practicable, site haul routes would be created adjacent to the route of the Proposed Scheme to transport construction materials and equipment to reduce heavy goods vehicle (HGV) movements on public roads with access taken via the main road network;
- HGV would be routed, insofar as reasonably practicable, along the strategic and/or primary road network;
- the use of the local road network would, insofar as reasonably practicable, be limited to use for site set-up, access for surveys and on-going servicing (including refuse collection and general deliveries to compounds) during construction;

- the reuse of excavated material along the route of the Proposed Scheme, insofar as reasonably practicable;
- highway measures including junction improvements, passing places and carriageway widening would be provided, as required, to manage the safe passing of construction vehicles on construction HGV routes; and
- on-site welfare facilities would be provided which would reduce daily travel by site workers.

14.4.2 Section 14 of the draft Code of Construction Practice (CoCP)[138] 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 to 18:00 on weekdays and 08:00 to 13:00 on Saturdays with site staff and workers generally arriving before the morning peak hour and departing after the evening peak hour.

14.4.6 The number of private car trips to and from the construction compounds (both workforce and visitors) would be reduced by encouraging alternative sustainable modes of transport or vehicle sharing. This would be supported by an overarching framework travel plan that would require construction workforce travel plans[139] 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.

14.4.7 Where works potentially affect Network Rail assets, disruption to travelling passengers and freight movements would be reduced insofar as reasonably practicable. This includes measures such as:

[138] Supporting document: Draft Code of Construction Practice
[139] 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.

- programming the construction works to coincide with the possessions that are required and planned by Network Rail for the general maintenance of their railway;
- planning the required construction works so that they can be undertaken in short overnight stages so that passenger services are not disrupted; and
- programming longer closures at the weekend and on bank holidays to reduce insofar as reasonably practicable the number of passengers affected.

Assessment of impacts and effects

Temporary effects

14.4.8 The traffic and transport impacts during the construction period within the Appleby Parva to Ashby-de-la-Zouch area are likely to include:

- construction vehicle movements to and from the various construction compounds;
- road closures and associated realignments and diversions;
- alternative routes for PRoW; and
- possessions on the conventional rail network.

14.4.9 The construction assessment has also considered any impacts in the Appleby Parva to Ashby-de-la-Zouch area that arise from construction of the Proposed Scheme in the adjoining community areas.

14.4.10 Construction vehicle movements required to construct the Proposed Scheme would include the delivery of plant and materials, movement of excavated materials and site worker trips. Works would include utilities diversions, earthworks, underpass, viaduct, bridge and highway construction.

14.4.11 Construction activities would be managed from compounds. Details of the construction compounds are provided in Section 2.3. The locations of the compounds are shown in Map Series CT-05 in the Volume 2: LA03 Map Book.

Strategic and local road network traffic

14.4.12 The primary HGV access routes for construction vehicles would be the strategic and/or primary road network with the use of the local road network limited, 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 M42 junction 11;
- the A444 Atherstone Road south east of junction 11 of the M42 to Austrey Lane;
- the A444 Acresford Road north-west of junction 11 of the M42 to Measham Road;

- the A511 Ashby Road east of junction 13 of the A42 to Corkscrew Lane;
- the B4116 from junction 12 of the A42 to Measham Road;
- the B5493 (south-west of the M42 junction 11) to No Man's Heath;
- Tamworth Road between junction 11 and Huntingdon Way (Measham);
- Huntingdon Way in Measham;
- Burton Road, Measham;
- Measham Road between Huntingdon Way and Acresford Road;
- Vicarage Lane in Packington;
- Measham Road in Packington;
- Bridge Street in Packington;
- Heather Lane in Packington;
- Normanton Road in Packington;
- Coleorton Lane north of Packington;
- Corkscrew Lane in New Packington; and
- Leicester Road in New Packington.

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:

- Burton Road east of Huntingdon Way;
- Measham Road, west of Measham;
- Huntingdon Way, south of Repton Road;
- the B4116 Measham Road, south of the A42 junction 12;
- Ashby Road, north of Packington and south of the A42;
- Leicester Road, west of New Packington and east of the A42; and
- the A511 Ashby Road, at the A42 junction 13.

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 not expected that construction of the Proposed Scheme would have any impacts on parking and loading

Public transport network

14.4.19 There are no temporary road closures or diversions required in this area that would substantially affect bus services or stops although any increase in general traffic delays could affect bus services. Any consequent effects will be reported in the formal ES.

14.4.20 There are interfaces with the existing rail network in this area, in particular on the operation of the Leicester to Burton upon Trent Line (freight-only). The majority of the rail possessions would have little or no impact on the operation of rail services as they would be relatively minor localised works, such as work on and adjacent to track when not in use. This could result in disruption to services although many of the interventions would be combined to reduce the frequency of potential disruption. The effects of railway possessions will be assessed and reported in the formal ES.

Non-motorised users

14.4.21 The construction works associated with the Proposed Scheme would require the temporary closure or diversion/realignment of PRoW and roads. There would be temporary alternative routes for a number of PRoW in the vicinity of the Proposed Scheme but these would all be interim changes prior to permanent changes. Where necessary, PRoW would be re-routed around construction compounds.

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 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 has the potential to lead to additional congestion and delays for road users on a number of routes including: the M42 junction 11, the A42; the A444 Atherstone Road; the A511 Ashby Road; the B4116 from A42 junction 12 to Measham Road; the B5493 south west of M42 junction 11; Tamworth Road; Huntingdon Way; Burton Road/Measham Road; Measham Road/Bridge Street/Heather Lane; Normanton Road/Coleorton Lane; Corkscrew Lane; Vicarage Lane and Leicester Road. Increases in traffic could also result in increased traffic severance for non-motorised users of the routes and changes in traffic could result in a change in accident risk.

14.4.28 Construction of the Proposed Scheme is expected to result in temporary highway closures and diversions or realignments. These are expected to include: the A511 Ashby Road, the B4116 Measham Road, Huntingdon Way, Burton Road/Measham Road, Ashby Road and Leicester Road.

14.4.29 The assessment of significant effects in relation to traffic and transport during construction of the Proposed Scheme will be reported in the formal ES.

14.5 Effects arising from operation

Avoidance and mitigation measures

14.5.1 The following measures have been included as part of the design of the Proposed Scheme and would avoid or reduce impacts on transport users:

- reinstatement of roads on or close to their existing alignments; 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 Appleby Parva to Ashby-de-la-Zouch 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:

- to the south of the M42 junction 11, the A444 Atherstone Road would be permanently diverted onto an overbridge to the north-east of its current alignment;
- Tamworth Road would be permanently diverted on an overbridge to the south-east of its current alignment;
- Rectory Lane would be permanently diverted to the east to tie in with the realigned Tamworth Road;
- the A42 would be realigned to the west for a 2km length in the vicinity of Measham;
- New Street would be realigned over a new overbridge, crossing both the route of the Proposed Scheme and the A42;
- Willesley Wood Side would be permanently diverted to tie in with the B4116 Measham Road;
- Vicarage Lane would be permanently realigned to the south of its current alignment to cross the route of the Proposed Scheme; and
- the A512 Ashby Road would be permanently realigned, to the east of the existing alignment.

14.5.6 The permanent highway changes are not expected to result in significant changes in travel distances. The effects of these changes, including on non-motorised users will be reported in the formal ES.

Accidents and safety

14.5.7 Changes in traffic could result in changes in accident risk. Operational effects arising from the Proposed Scheme will be reported in the formal ES.

Public transport network

14.5.8 The permanent realignment of roads could increase travel distances for bus passengers. However, as most of the realignments are likely to be less than 1km in length, these are not expected to have significant effects on public transport within the Appleby Parva to Ashby-de-la-Zouch area.

Non-motorised users

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

- Leicestershire Bridleway Q19/3 diverted to the south to cross the Proposed Scheme via the Salt Street overbridge;
- Leicestershire Footpath Q12/1 diverted to the south as a result of the realignment of the A444 Atherstone Road;
- Leicestershire Footpath Q13/1 minor diversion as a result of diversion of Rectory Lane;
- Leicestershire Footpath Q3/1 diverted on to the realignment of Tamworth Road;
- Leicestershire Footpath Q3/2 diverted on to the realignment of Tamworth Road;
- Leicestershire Footpath P81/1 diverted in the vicinity of Measham Wharf Development site to cross under the route of the Proposed Scheme at Ashby Canal Restoration Underbridge;
- Leicestershire Footpath P75/6 diverted from the existing bridge over the A42 to the west crossing under the route of the Proposed Scheme at Ashby Canal Restoration Underbridge;
- Leicestershire Footpath P75/5 would be closed, users would be permanently diverted to the realigned Footpath P81/1;
- Leicestershire Bridleway P67/5 would be closed, users would be permanently diverted on to the realigned Footpath P81/1;
- Leicestershire Footpath P69/4 realigned to connect to the realigned Footpath P81/1;
- Leicestershire Footpath P1/1 diverted to the east of the Proposed Scheme on to the B4116 Measham Road;
- Leicestershire Bridleway P8/1 closed, users would be diverted to the west of the Proposed Scheme onto the diverted Willesley Woodside;
- Leicestershire Footpath O68/4 realigned to join Measham Road;
- Leicestershire Bridleway O70/1 diverted on to the realignment of Vicarage Lane;
- Leicestershire Footpath O71/2, north of Packington, diverted to the west under the Gilwiskaw Brook Viaduct;
- Leicestershire Footpath O74/2, west of Ashby Road, to the west under the Gilwiskaw Brook Viaduct;

- Leicestershire Footpath O72/1 diverted to the east of the Proposed Scheme onto the realigned Bridleway P20/1 to the north;
- Leicestershire Bridleway P20/1 realigned to the east of the Proposed Scheme, between Ashby Road and Leicester Road;
- Leicestershire Footpath M60/2 would be closed; the route is currently a 60m path south-east of the A512 Ashby Road connecting it to Footpath M60/3, this connection would be provided to the east as part of the Footpath M60/3 diversion;
- Leicestershire Footpath M60/3 diverted to the east of the Proposed Scheme to join the diverted M30/1 in the vicinity of Flagstaff Farm; and
- Leicestershire Footpath M30/1 diverted to the north-east of the Proposed Scheme, to the east of Flagstaff Farm.

14.5.10 The realignment of some of the PRoW would increase journey distance and time for non-motorised users and may result in significant effects. It is expected that the greatest increases in journey distance (likely to be in excess of 500m) would affect the users of the following PRoW: Bridleway Q19/3, Footpath Q12/1, Footpath Q3/1, Footpath Q3/2, Footpath P75/6, Footpath P75/5 and Footpath P1/1. The assessment of these changes will be reported in the formal ES.

Other mitigation measures

14.5.11 HS2 Ltd is continuing to engage with local highway and transport authorities regarding the need for highway and public transport measures to mitigate the impacts of the Proposed Scheme in the area.

14.5.12 Any further traffic and transport mitigation measures required during the operation of the Proposed Scheme will be considered based on the outcomes of the assessment. These will be reported in the formal ES.

Summary of likely residual significant effects

14.5.13 Operation of the Proposed Scheme would require the permanent diversion or realignment of: the A42, the A444 Atherstone Road, the A512 Ashby Road, Rectory Lane, Tamworth Road, New Street, Willesley Wood Side and Vicarage Lane although these are unlikely to result in permanent significant effects. Increases in traffic could also result in increased traffic severance for non-motorised users of the routes and changes in traffic could result in a change in accident risk.

14.5.14 The following PRoW, footpaths (FP)/bridleways (BW), would require permanent diversion/realignment: BW 19/3; FP Q12/1; FP Q13/1; FP Q3/1; FP Q3/2; FP P81/1, FP P75/6; FP P69/4; FP P1/1; FP O68/4; BW O70/1; FP O71/2; FP O74/2; FP O72/1; BW P20/1; FP M60/3; and FP M30/1. The following PRoW would be closed: FP75/5, FP67/5, FP8/1 and FP60/2.

14.5.15 The assessment of significant effects in relation to traffic and transport during operation of the Proposed Scheme will be reported in the formal ES.

Monitoring

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

14.5.17 There are no other area-specific monitoring requirements currently proposed for traffic and transport in the Appleby Parva to Ashby-de-la-Zouch 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 Appleby Parva to Ashby-de-la-Zouch area. The likely impacts and significant effects identified to date arising from the construction and operation of the Proposed Scheme on surface water and groundwater bodies and their associated water resources are reported. The likely impacts and significant effects of the Proposed Scheme on flood risk and land drainage are also reported.

15.1.2 Engagement has been undertaken with the Environment Agency, Canal & River Trust (CRT), North West Leicestershire District Council (NWLDC), Leicestershire County Council (LeCC), which is the Lead Local Flood Authority (LLFA) and Severn Trent Water Limited (the local water and sewerage undertaker). The purpose of this engagement has been to obtain relevant baseline information and to discuss the Proposed Scheme and potential effects. Engagement with these stakeholders will continue as part of the development of the Proposed Scheme.

15.1.3 Maps showing the location of the key environmental features (Map Series CT-10), and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2: LA03 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, Section 16, Water resources and flood risk covers the following at a route-wide level:

- the risk to water resources associated with accidents or spillages from trains during operation of the Proposed Scheme;
- a summary of how the Proposed Scheme aims to demonstrate compliance with the statutory requirements of the Water Framework Directive (WFD); and
- route-wide flood risk issues related to alignment of the Proposed Scheme with the Sequential Test and Exception Test policies in the National Planning Policy Framework (NPPF)[140].

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)[141].

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

[140] National Planning Policy Framework, DCLG, 2015.
[141] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

of the centre line of the route of the Proposed Scheme, as described in Section 2.2 of this report.

15.2.3 This assessment is based on desk study information, including information provided to date by consultees and stakeholders, as well as surveys of accessible water features.

15.2.4 Where surveys have not been undertaken due to land access constraints, a precautionary approach has been adopted in the assessments of receptor value and impact magnitude.

15.2.5 Hydraulic analysis is currently being undertaken of watercourses and key structures within flood risk areas. This includes modelling of the River Mease.

15.2.6 Groundwater levels are being inferred from the available Environment Agency groundwater level monitoring boreholes, historic borehole logs and topographic data, as well as from spring and watercourse locations.

15.2.7 Impacts on biological receptors such as aquatic fauna and flora are assessed in Section 7, Ecology and biodiversity.

15.2.8 The assessments in this working draft ES are based on professional judgement using the information that is currently available. A precautionary approach has been adopted with regard to assessing the potential for adverse impacts to occur. The surveys, analysis and modelling work currently in progress, and the results of the consultation process, will be used to refine the assessments reported in the formal ES.

15.3 Environmental baseline

Surface water

15.3.1 All surface water bodies in the study area fall within the Staffordshire Trent Valley management catchment of the Humber river basin district (RBD).

15.3.2 The river basin management plan[142] identifies the chemical[143] and ecological[144] status of surface water bodies, and the quantitative[145] and chemical[146] 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 good status where this has not already been achieved. The Proposed Scheme should also avoid adverse impacts on protected or priority species and habitats.

[142] Environment Agency (2015), Water for life and livelihoods Part 1: Humber river basin district: River basin management plan.
[143] The chemical status of surface waters reflects concentrations of priority and hazardous substances present.
[144] 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.

[145] 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.
[146] The chemical status of a groundwater body reflects effects on drinking water protected areas, its general quality, the importance of water quality within the water body for GWDTEs and surface water interactions and whether there are intrusions of poor quality groundwater present.

15.3.4 Specialist field surveys are being undertaken, where access is available. Receptor values will be adjusted to reflect the outputs from these surveys, in close consultation with the Environment Agency. In the absence of field surveys, surface water bodies, other than minor ponds and ditches, have been identified within this assessment as being of either high or very high value on a precautionary basis.

15.3.5 Summary information relating to the surface water bodies potentially affected by the Proposed Scheme within the study area is provided in Table 32. The receptor value attributed to each individual water body is based on the methodologies set out in the SMR.

Table 32: Surface water body receptors

Water body name and location [147]	**Designation**	**Q95 value (m^3/s)**[148]	**Receptor value**	**Parent WFD water body name and identification number**[149]	**Current WFD status/Objective**[150]
River Mease WR-01-352b I6	Main river	0.06	Very high	River Mease from Gilwiskaw Brook to Hooborough Brook GB104028046570	Poor/good by 2027
Gilwiskaw Brook WR-01-353a F6	Main river	0.03	Very high	Gilwiskaw Brook from Source to River Mease GB104028046590	Moderate/good by 2027
Tributary 1 to Coleorton Brook WR-01-353a H6	Ordinary watercourse	≤0.002	Moderate		
Tributary 2 to Coleorton Brook WR-01-353a H6	Ordinary watercourse	0.005	Moderate		

Abstractions and permitted discharges (surface water)

15.3.6 There are two[151] licensed surface water abstractions in the study area. Neither are located within the land required for the construction and operation of the Proposed Scheme. One licence is for a private water supply at Radford for general use and production of energy, with a maximum daily abstraction of 560m3 from Willesley

[147] The feature locations are indicated by the grid coordinates on the relevant Volume 2: LA03 Map Book figure (in this case WR-01).
[148] This is the flow within the watercourse that is exceeded for 95% of the time.
[149] The Environment Agency has attributed each surface water and groundwater body a unique water body identification (ID) number.
[150] Status and objectives are based on those set out in the 215 River basin management plan
[151] The number of consents quoted is different to the number quoted in Section 10, Land quality because the Water resources and flood risk study area considers surface water and groundwater features within 1km of the centreline of the Proposed Scheme and do not count revoked consents. The land quality study area considers an area extending 250m from the land required for the construction of the Proposed Scheme.

pond. This abstraction has been assessed as a high value receptor. The remaining licence is for a private water supply at Radford for spray irrigation, with a maximum daily abstraction of 65m3 also from Willesley pond and this abstraction has been assessed as 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 groundwater supplies may be present. Private water supplies would be assessed as high value receptors unless details obtained from the owner indicate otherwise.

15.3.8 There are 14[152] consented discharges in total to surface waters within the study area. Three of these are located within the land required for the Proposed Scheme. These have been assessed as being receptors of low value.

Groundwater

15.3.9 The geology of the study area is described in Section 10, Land quality, and the superficial and bedrock hydrogeology is summarised in Table 33. Unless stated otherwise, the geological groups listed would all be crossed by the Proposed Scheme. Table 33 also identifies the receptor values attributed to each groundwater receptor based on the methodologies set out in the SMR.

Table 33: Summary of geology and hydrogeology in the study area

Geology[153]	**Distribution**	**Formation description**	**Aquifer classification**	**WFD body (ID) and current overall status**[154]	**WFD status objective**[155]	**Receptor value**
Superficial deposits						
Made ground	North of Measham and east of Ashby-de-la-Zouch	Man-made deposit including areas of worked and infilled ground	Not classified	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Low
Alluvium	Along Gilwiskaw Brook, the River Mease and its	Clay silt, sand, peat and gravel	Secondary A	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Moderate

[152] The number of consents quoted is different to the number quoted in Section 10, Land quality because the Water resources and flood risk study area considers surface water and groundwater features within 1km of the centreline of the Proposed Scheme and do not count revoked consents. The land quality study area considers an area extending 250m from the land required for the construction of the Proposed Scheme.
[153] 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, when the Group/ Formation / Member classification was adopted by the Geological Survey, replacing the earlier classification adopted by the pioneer geological surveyor's in the 19th century. 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.
[154] As stated in the 2015 River basin management plan.
[155] As stated in the 2015 River basin management plan.

Geology[153]	**Distribution**	**Formation description**	**Aquifer classification**	**WFD body (ID) and current overall status**[154]	**WFD status objective**[155]	**Receptor value**
	tributaries					
River terrace Deposits	Along Gilwiskaw Brook, the River Mease and its tributaries	Sand and gravel	Secondary A	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Moderate
Glaciofluvial Deposits	Along Gilwiskaw Brook and the River Mease	Sand and gravel	Secondary A	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Moderate
Glacial Till	Isolated areas to the south of Willesley	Clay with sand and gravel	Secondary (undifferentiated)	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Low
Bedrock						
Mercia Mudstone Group - Sidmouth Mudstone Formation	Majority of the study area east of No Man's Heath and south-west of Appleby Parva	Sandstone, mudstone and siltstone	Secondary B	Tame Anker Mease - Secondary Combined (GB40402G990800) Good	Good by 2015	Moderate
Mercia Mudstone Group - Tarporley Siltstone Formation	Majority of the study area south-west and north-east of Measham, south of Ashby-de-la-Zouch	Sandstone, mudstone and siltstone	Secondary (Undifferentiated, mudstone and siltstone) Secondary A (Sandstone)	Tame Anker Mease - Secondary Combined (GB40402G990800) Good	Good by 2015	Moderate
Sherwood Sandstone Group - Helsby Sandstone Formation	South-west of Measham, around Ashby-de-la-Zouch	Sandstone, weathering to sand near surface	Principal	Tame Anker Mease - PT Sandstone Burton (GB40401G301200) Poor	Good by 2027	Very high
Sherwood Sandstone Group - Chester Formation	Centre of Measham and south of Oakthorpe	Sandstone with mudstone	Principal	Tame Anker Mease - PT Sandstone Burton (GB40401G301200)	Good by 2027	Very high

Geology[153]	Distribution	Formation description	Aquifer classification	WFD body (ID) and current overall status[154]	WFD status objective[155]	Receptor value
				Poor		
Sherwood Sandstone Group Moira Formation	Measham and Oakthorpe. Isolated areas through Packington and Willesley	Sandstone with mudstone	Principal	Tame Anker Mease - PT Sandstone Burton (GB40401G301200) Poor	Good by 2027	Very high
Pennine Coal Measures Group - Pennine Middle Coal Measures Formation	Central part of the study area north and north-east of Measham	Mudstone, siltstone and sandstone, with interbedded coal seams	Secondary A	Tame Anker Mease - Coal Measures Swadlincote (GB40402G303600) Poor	Poor by 2015	Moderate
Pennine Coal Measures Group - Pennine Lower Coal Measures Formation Wingfield Flags Formation	North of Measham and west and south of Ashby-de-la-Zouch	Mudstone, siltstone and sandstone, with interbedded coal seams	Secondary A	Tame Anker Mease - Coal Measures Swadlincote (GB40402G303600) Poor	Poor by 2015	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 29, is outlined briefly as follows:

- alluvium, river terrace deposits and glaciofluvial deposits 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 classified as moderate value receptors;
- glacial till deposits may supply baseflow to watercourses or store and yield limited amounts of groundwater, so have been classified as low value receptors; and
- bedrock aquifers.

15.3.11 The basis of the receptor values attributed to the bedrock aquifers present within the study area, as shown in Table 33 is outlined briefly as follows:

- the Mercia Mudstone Group has traditionally been regarded as predominantly impermeable or, at best, a poor aquifer (the mudstone and siltstone formations). Limited quantities of groundwater suitable for domestic or

agricultural use are, however, occasionally obtainable within the sandstone beds of this rock formation and it has, therefore, been classified as a moderate value receptor;

- the Sherwood Sandstone Group (locally comprising sandstone of the Helsby Sandstone Formation, Chester Formation and the Moira Formation) has been classified as a principal aquifer by the Environment Agency. This aquifer can also provide an important component of baseflow to rivers and is located within a Source Protection Zone (SPZ) 3. It has, therefore, been assessed as a very high value receptor; and
- the Pennine Coal Measures Group is generally described as an alternation of sandstone, siltstone and mudstone, with frequent coal seams and seat earth horizons. This Group outcrop or underlie some superficial deposits and Mercia Mudstone or Sherwood Sandstones Group. Limited quantities of groundwater suitable for domestic or agricultural use are, however, occasionally obtainable within the sandstone beds of this rock formation and it has, therefore, been classified as a moderate value receptor.

WFD status of groundwater bodies

15.3.12 A summary of locations, current overall WFD status, and future overall status objectives associated with the designated bedrock groundwater bodies within the study area is provided in Table 33. The value attributed to each of these receptors is also indicated.

15.3.13 The superficial deposits in the study area are not formally designated as WFD groundwater bodies but may be hydraulically connected to the WFD bedrock aquifers.

Abstraction and permitted discharges (groundwater)

15.3.14 There are no groundwater abstractions licenced for public water supply in the study area, although a Source Protection Zone 3 (SPZ3)[156], associated with the Tarporley Siltstone Formation, is located between Appleby Parva and Oakthorpe.

15.3.15 There is one private groundwater abstraction licence registered in the study area, as shown on Map WR-02-201. The licence is for a private agricultural supply for non-potable use and is assessed as being a high value receptor. The abstraction is not located within the land required for the Proposed Scheme.

15.3.16 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. Unregistered private groundwater supplies may also be present. Private water supplies have been assessed as high value receptors unless details obtained from the owner indicate otherwise.

15.3.17 There are six[157] consented discharges to groundwater within the study area which are private sewage discharges of final/treated effluent. One of these is located within the

[156] Defined by the Environment Agency as the area around a source within which all groundwater recharge is presumed to be discharged at the source

land required for the Proposed Scheme at Willesley. These discharges have been assessed as low value receptors.

Groundwater – surface water interactions

15.3.18 Desk-based assessment using Ordnance Survey maps and detailed river network data provided by the Environment Agency identified 11 features within the study area that had the potential to be springs; none of these features are within the land required for the construction of the Proposed Scheme. Access was not possible to inspect any of these features at this stage.

15.3.19 The 11 potential spring features that have yet to be inspected are assumed to be high value receptors on a precautionary basis.

15.3.20 There are 25 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 There is one nature conservation site feature within the study area which is potentially groundwater dependent. Saltersford Wood Local Nature Reserve (LNR) is located 940m north-west of the route of the Proposed Scheme at Measham and is assumed to be groundwater dependent. It includes areas of open water known as 'flashes' which are assumed to be groundwater dependent.

15.3.22 There is one nature conservation site within the study area which is potentially dependent on surface water flows. The River Mease Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI), comprising the lower section of the tributary of the Gilwiskaw Brook, is a surface watercourse crossed by the Proposed Scheme at Measham and also crossed 730m upstream of the designation at Packington.

15.3.23 Further details of the ecology of these sites, including the reporting on the effects and associated other mitigation, are provided in Section 7, Ecology and biodiversity.

Existing baseline - flood risk and land drainage

15.3.24 The Environment Agency's Flood map for planning (rivers and sea)[158] 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).

[157] The number of consents quoted is different to the number quoted in Section 10, Land quality because the Water resources and flood risk study area considers surface water and groundwater features within 1km of the centreline of the Proposed Scheme and do not count revoked consents. The land quality study area considers an area extending 250m from the land required for the construction of the Proposed Scheme.
[158] Gov.uk (2018) Flood map for planning. Available online at: https://flood-map-for-planning.service.gov.uk/

15.3.25 The updated Flood map for surface water[159] has been used to scope surface water flood risks. Infrastructure failure flood risks have been scoped using the Environment Agency risks of flooding from reservoirs national dataset[160]. The British Geological Survey national dataset, Areas susceptible to groundwater flooding[161], has been used to assess the future risk of groundwater flooding.

15.3.26 The following reports were used to help determine the baseline flood risk within the study area:

- Leicestershire Preliminary Flood Risk Assessment (PFRA) (2011)[162];
- North West Leicestershire Strategic Flood Risk Assessment (SFRA) (2015)[163]; and
- Leicestershire Local Flood Risk Management Strategy (LFRMS) (2015)[164].

River flooding

15.3.27 The study area includes substantial areas of floodplain (Flood Zone 2 and 3) associated with the River Mease and Gilwiskaw Brook at Measham and north-east of Packington, respectively. Other floodplains that would be crossed by the route of the Proposed Scheme include those associated with the tributary of Coleorton Brook, east of Ashby-de-la-Zouch. Table 34 shows all the relevant watercourses within the study area with receptors that would potentially be affected by any changes in flood magnitude. The value of these receptors, based on the definitions in Table 57 of the SMR, is also indicated.

Table 34: River flood risk sources and receptors

Source	Location description and figure/coordinate [165]	Receptor potentially affected	Receptor value/sensitivity to flooding
River Mease	Measham WR-01-353b I6	A42	Very high
		Residential properties at Wordsworth Way	High
		Residential properties at Mallard Close	High
		Residential properties at Siskin Close	High
		Riverside Court Westminster Industrial Estate - retail and offices	Moderate
		Riverside Court Westminster Industrial Estate	Very high

[159] Gov.uk (2018) Learn more about this area's flood risk. Available online at: https://flood-warning-information.service.gov.uk/long-term-flood-risk/
[160] Gov.uk (2018) Learn more about this area's flood risk. Available online at: https://flood-warning-information.service.gov.uk/long-term-flood-risk/
[161] British Geological Survey (2017) BGS groundwater flooding. Available online at: http://www.bgs.ac.uk/products/hydrogeology/groundwaterFlooding.html
[162] Leicestershire Preliminary Flood Risk Assessment (PFRA) (2011) Leicestershire County Council
[163] North West Leicestershire Strategic Flood Risk Assessment (SFRA) (2014) Atkins
[164] Leicestershire and Staffordshire Local Flood Risk Management Strategy (LFRMS) (2015) Leicestershire County Council
[165] This is the location at which the source intersects the Proposed Scheme, as indicated by the grid coordinates on the relevant Volume 2: LA03 Map Book figure (in this case WR-01).

Source	Location description and figure/coordinate [165]	Receptor potentially affected	Receptor value/sensitivity to flooding
		Widgeon Drive	Moderate
		Wordsworth Way	Moderate
		Huntingdon Way	Moderate
Gilwiskaw Brook	Gilwiskaw Brook at Packington WR-01-353a F6	Residential properties at Mill Street	High
		Residential properties at Homecroft Drive	High
		Mill Street	Moderate
		Bridge Street	High
	Gilwiskaw Brook at Ashby-de-la-Zouch WR-01-353a G4 WR-01-353a G5	A42 south of Ashby-de-la-Zouch	Very high
		Stuart Way	Moderate
		Tudor Close	Moderate
		Residential properties at Lower Packington Road	High
		Residential properties at Rescue Way	High
		Residential properties at Spinney Close	High
		Residential properties at Stuart Way	High
		Residential properties at Tudor Close	High
		Residential property at Windsor Close	High
		Electricity Sub-Station (NGR 435607, 316285), just outside of the 1km buffer (1.03km)	Very high
		Commercial property at Bath Grounds at Station Road	Moderate
		Residential properties at The Bield, Priory Park Road	High
		Former site of mines rescue centre at Lower Packington Road	Moderate
Coleorton Brook (tributary of Gilwiskaw Brook, east) and its tributaries	Ashby-de-la-Zouch WR-01-353a G6	The Croft residential properties	High
		Residential properties at Chapmans Meadows	High
		Residential properties at Lower Packington Road	High
		Upper Packington Road	Moderate
		Leicester Road	Moderate
		Coalfield Way	Moderate

Surface water flooding

15.3.28 There are numerous areas that are susceptible to surface water flooding within the study area. The key sources and receptors with potential to be affected are shown in Table 35. The value of these receptors, based on Table 57 of the SMR, is also indicated.

Table 35: Surface water flood risk sources and receptors

Source	Location description and figure/coordinate[166]	Receptor potentially affected	Receptor value
Surface water flow path at Cottage Farm in Packington	Vicinity of Packington Farm Cottage WR-01-353a G6	Agricultural land north-west of Farm Cottage (north and south of the A42) in Packington	Moderate
		Measham Road in Measham	High
		A42 at Measham Road	Very high
Surface water flow path at Leicester Road in Ashby-de-la-Zouch	Leicester Road in Ashby-de-la-Zouch and vicinity WR-01-353a G6	Leicester Road, New Packington in Ashby-de-la-Zouch	High
		Residential properties at Leicester Road, New Packington in Ashby-de-la-Zouch	High
		Agricultural land south of Leicester Road	Moderate

Artificial water bodies

15.3.29 Flooding from artificial water bodies may occur due to failure of an impounding structure, such as a dam or canal embankment. Artificial water bodies with potential implications for flood risk within the study area include Willesley Lake near Willesley Park, which discharges to Saltersford Brook. Willesley Lake is the only artificial water body with potential to affect flood risks of relevance to the Proposed Scheme. However, as this is a raised reservoir, subject to the requirements of reservoir safety legislation[167], the inundation risk posed by this reservoir is considered negligible.

15.3.30 In addition, there are reinstatement plans being considered for the Ashby Canal at Measham. These reinstatement plans aim to connect this location to the existing canal network, which is approximately 1km east of the Proposed Scheme. If the restored canal was to suffer a failure to a section of embankment, the area adjacent to the canal south of Oakthorpe and around New Street could be at risk of flooding.

Groundwater flooding

15.3.31 Information related to historical incidents of groundwater flooding in the Appleby Parva to Ashby de-la-Zouch area is provided within the LeCC LFRMS, LeCC PFRA and the North-West Leicestershire SFRA. These state that the risk of groundwater flooding is low within North West Leicestershire but can contribute to flooding from other sources.

[166] This is the location at which the source intersects the Proposed Scheme, as indicated by the grid coordinates on the relevant Volume 2: LA03 Map Book figure (in this case WR-01).
[167] Department for Environment Food and Rural Affairs and the Environment Agency; Reservoirs: owner and operator requirements. Available online at: https://www.gov.uk/guidance/reservoirs-owner-and-operator-requirements

15.3.32 The BGS Groundwater flooding susceptibility dataset indicates that there is some potential for groundwater flooding to occur to the south of Measham in the River Mease floodplain and to the west and south of Packington, in the Gilwiskaw Brook floodplain. These areas are underlain by alluvium and river terrace deposits.

Land drainage

15.3.33 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 CoCP[168] includes a range of mitigation measures that aim to reduce construction impacts as far as is reasonably practicable. The avoidance and mitigation measures that are of particular relevance to water resources and flood risk during construction are described in the following sections of this report.

Water resources and WFD

15.4.2 The avoidance of sensitive receptors has reduced the risks associated with the Proposed Scheme not complying with the requirements of the WFD. Examples of this strategy include:

- avoidance of channels and floodplain areas, where reasonably practicable – the route of the Proposed Scheme would avoid passing along river or stream valleys, such as that of the River Mease 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.

[168] Supporting document: Draft Code of Construction Practice

15.4.3 The presence of any unregistered private water supplies, their function and the means of protecting or if necessary replacing them would be discussed with any landowners potentially affected by the Proposed Scheme.

15.4.4 The temporary works shown on Map Series CT-05 in the Volume 2: LA03 Map Book have been informed by a detailed consideration of the water resources constraints and have sought to avoid sensitive features wherever reasonably practicable.

15.4.5 Watercourse realignments are proposed at the following locations: tributary 2 Coleorton Brook (New Packington culvert) and Gilwiskaw Brook (Gilwiskaw Brook viaduct). The aim will be to design these with equivalent hydraulic capacity to the existing channels. The Proposed Scheme would also aim to ensure that field subsurface drainage systems can be adapted to discharge into the new channel. Where such watercourses are natural channels, the design principle will be to incorporate appropriate features to retain and, where reasonably practicable, enhance their hydromorphological condition[169].

15.4.6 Watercourse diversions, which would result in changes in flow regime within discrete sections of channel, have been avoided wherever possible. There are no diversions proposed within this study area.

15.4.7 For watercourses that are not in their natural condition, the design principle for realignments will be to incorporate measures, where reasonably practicable, to improve their hydromorphological condition, provided this is compatible with their flood risk and land drainage functions.

15.4.8 The design of infrastructure required within or in proximity to an existing channel (including bridge abutments, intermediate piers and outfalls) will aim to reduce impacts on the natural hydromorphology of watercourse channels, as far as is reasonably practicable.

15.4.9 The draft CoCP includes requirements to protect water bodies and their associated water resources from the potential impacts of pollution from construction site runoff, including where appropriate:

- provision of maps showing sensitive areas and buffer zones where no pollutants are to be stored or used; and
- preparation of method statements for silt management, site drainage at 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;

[169] "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.

- measures to prevent silt-laden runoff and other pollutants entering the water environment; and
- restrictions or controls on excavation within watercourses to limit effects on water quality, sedimentation, fisheries and aquatic ecology.

15.4.10 Method statements will be required for all watercourse crossings and channel realignments required for site haul routes. The method statements will describe how potential changes to flood risk, water quality and channel hydromorphology will be managed during the establishment, use and decommissioning of all site haul routes.

15.4.11 Permanent culverts proposed on the smaller watercourse crossings within this study area include the Measham Road Packington culvert over a drain at Measham Road in Packington and the New Packington culvert over tributary 2 to Coleorton Brook, at Ashby-de-la-Zouch. The detailed design of these culverts will be developed in general accordance with Construction Industry Research and Information Association (CIRIA), Environment Agency guidance and in consultation with Environment Agency specialists. The design has sought to mitigate the impact on the hydromorphology of the affected watercourses as follows:

- drop inlet culverts and inverted siphons have been avoided wherever reasonably practicable and are proposed on minor headwater channels or ditches only;
- culvert lengths have been reduced as far as is reasonably practicable; and
- invert levels will be set below the firm bed of the watercourse to allow a natural substrate to develop along the bed of the culvert.

15.4.12 The wider issues associated with these culverts, and how their detailed design will aim to ensure no deterioration in the status of any of the relevant water bodies WFD quality elements, will be considered within the formal ES.

15.4.13 Existing groundwater abstraction boreholes or monitoring points will be protected from physical damage, insofar as reasonably practicable, including appropriate decommissioning of abandoned boreholes in order to prevent pollution pathways. If boreholes are to be decommissioned and replaced with alternatives, the contractors will follow the latest good practices. This principle will also be applicable to springs potentially affected by the Proposed Scheme, although additional measures may be required to mitigate temporary construction impacts. Wherever reasonably practicable, the design will aim to recreate affected spring features nearby.

15.4.14 Measures would be introduced, as required, to mitigate the temporary and permanent effects on groundwater flows and water quality during excavation and construction of foundations and cuttings as far as is reasonably practicable. The types of measure likely to be adopted could include:

- installation of cut-off[170] structures around excavations;
- ensuring cut-off structures are driven to sufficient depths to meet an underlying strata or zone of lower permeability;
- promoting groundwater recharge, such as discharging pumped water to recharge trenches around excavations to maintain baseline groundwater and surface water conditions; and
- incorporating passive bypasses within the design, which could comprise a 'blanket' of permeable material, such as gravel, placed around temporary structures allowing groundwater to bypass the below-ground works, without a rise in groundwater levels on the upstream side.

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

Flood risk and land drainage

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

- the floodplain avoidance strategy would ensure that the impacts on flood flows within rivers and streams, and their floodplains, would be limited to those impacts associated with the intermediate pier structures on the viaducts of the River Mease and Gilwiskaw Brook floodplain. The Proposed Scheme includes replacement floodplain storage areas to replace losses associated with the piers;
- the temporary works shown on Map Series CT-05 in the Volume 2: LA03 Map Book have been informed by a detailed consideration of the flood risk constraints and have sought to avoid flood zones wherever reasonably practicable;
- provision has been made to pass surface water runoff and land drainage flows beneath sections of raised embankment that would cross surface water flow paths where reasonably practicable. This would be achieved using perimeter drainage and culverts, with their inverts set below the likely level of any upstream field subsurface drainage systems;
- in locations where the route of the Proposed Scheme would cross watercourses, the design aim is for structures to accommodate flood flows up to and including the 1 in 100 (1%) annual probability flood with an allowance for climate change based on latest guidance issued by the Environment Agency[171];
- runoff from the footprint of the infrastructure could occur more rapidly post-construction due to steeper slope angles and the permeability of the newly-

[170] Impermeable barrier preventing water flow
[171] Environment Agency (2016) Adapting to Climate Change. Advice for Flood and Coastal Erosion Risk Management Authorities

created surfaces. The design of drainage systems aims to ensure that there would be no significant increases in flood risk downstream, during storms up to and including the 1 in 100 (1%) annual probability design event, with an allowance for climate change based on the latest guidance issued by the Environment Agency;

- balancing ponds for new sections of highway and railway drainage have been sized on a precautionary basis, pending more detailed information about the permeability and runoff characteristics of existing and proposed ground surfaces;
- where the Proposed Scheme would be in cutting, drainage measures would be provided to prevent runoff entering 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 as far as is reasonably practicable, including the incorporation of passive hydraulic bypasses at cuttings and other below ground structures. These could for example comprise a 'blanket' of permeable material such as gravel.

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

- preparation of flood risk assessments and method statements for temporary works, including main construction and satellite compound drainage, watercourse crossings and realignments and temporary realignments in consultation with the Environment Agency, and where applicable, the LLFA and other relevant regulators;
- location of storage, machinery, equipment and temporary buildings outside flood risk areas where reasonably practicable;
- construction of outfalls during periods of low flow to reduce the risk of scour and erosion;
- design of temporary watercourse realignments with equivalent hydraulic capacity to the existing channels, ensuring that field subsurface drainage systems can be adapted to discharge into the new channel; and
- having regard to the requirement for construction activities to avoid any increases in flood risk to vulnerable receptors.

15.4.18 In accordance with Section 16 of the draft CoCP, monitoring would also be undertaken in consultation with the Environment Agency and, where applicable, the LLFA, to ensure that temporary structures are installed, maintained and removed in accordance with the relevant environmental approvals and that impact on existing land drainage systems are managed appropriately.

Assessment of impacts and effects

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

Temporary effects – Water resources and WFD

Surface water

15.4.20 Potential temporary impacts on surface water quality, due to site runoff and increased pollution risk, are a key concern during construction and have the potential to affect abstractions and the water environment more generally. However, the practices outlined in the draft CoCP are considered adequate to mitigate any impacts, such that there are unlikely to be any significant effects.

Groundwater

Aquifers

15.4.21 The proposed cuttings in the study area would intersect the Sidmouth Mudstone Formation Secondary B Aquifer, Helsby Sandstone Formation Principal Aquifer, Chester Formation Principal Aquifer, Moira Formation Principal Aquifer, Pennine Coal Measures Group Principal and Secondary A Aquifers, Tarporley Siltstone and Mudstone Formation Secondary A Aquifer, Tarporley Sandstone Formation Secondary A and Secondary undifferentiated Aquifers, and the Pennine Coal Measures Group Principal and Secondary A Aquifers. Whilst there are likely to be minor localised impacts, the implementation of the measures outlined in the draft CoCP is likely to mean that any impacts on the overall status of these aquifers would not be significant.

15.4.22 Where cuttings could affect local receptors, such as groundwater abstractions or springs, this is reported in the sections below.

Abstractions

15.4.23 There is one licensed private groundwater abstraction at Hill Farm, Stretton en le Field, 800m north-west of the route of the Proposed Scheme. This abstraction is licensed for spray irrigation up to 1,632m3 per day, and it has been assessed as a high value receptor. The depth of the abstraction is 120m below ground level and hence is not affected by changes in localised groundwater levels as a result of the construction of the Proposed Scheme. For this reason, impacts on this abstraction are likely to be negligible, resulting in no significant effects.

Groundwater - surface water interactions

15.4.24 There are no anticipated temporary impacts on springs in the study area.

15.4.25 Measham Road Packington cutting has the potential to cause a minor impact on the flow of Gilwiskaw Brook due to reduced baseflow from dewatering. As Gilwiskaw Brook is a very high value receptor this has the potential to result in a moderate adverse effect, which would be significant.

Water dependent habitats

15.4.26 The Proposed Scheme is not anticipated to temporarily impact groundwater flow or quality at Saltersford Wood LNR, therefore there is no anticipated hydrological impact on this site.

15.4.27 The realignments of Gilwiskaw Brook under the Gilwiskaw Brook viaduct at Packington has the potential to result in a minor impact on the hydromorphology of the River Mease SAC and SSSI.

Temporary effects - flood risk and land drainage

15.4.28 Construction of the River Mease viaduct and Gilwiskaw Brook viaduct would require temporary working within flood zones. This includes a proposed site haul route that would require a crossing the River Mease and Gilwiskaw Brook on a temporary bridge. Furthermore, there are likely to be temporary construction works (i.e. cofferdams[172]) required to construct the New Packington culvert. 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 would be undertaken would be produced by the nominated undertaker in consultation with the Environment Agency and the LLFA. It is not anticipated that these temporary activities would result in significant effects related to flood risk and land drainage.

Permanent effects – water resources and WFD

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

Surface water

15.4.30 The location of the piers of the Gilwiskaw Brook viaduct are within the floodplain, avoiding the watercourse following realignment, and have the potential to impact the hydromorphology of the Gilwiskaw Brook by constraining the ability of the channel to move within its floodplain. This has the potential to cause a minor impact on the Gilwiskaw Brook, which is a very high value receptor. With embedded mitigation, this would result in a minor adverse effect, which is not expected to be significant.

15.4.31 The location of the piers of the River Mease viaduct are within the floodplain, avoiding the watercourse, and have the potential to impact the hydromorphology of the River Mease by constraining the ability of the channel to move within its floodplain. This has

[172] A watertight enclosure pumped dry to permit construction work below the waterline

potential to cause a minor impact on the River Mease, which is a very high value receptor. With embedded mitigation, this would result in a minor adverse effect, which is not expected to be significant.

15.4.32 The realignment of tributary 2 of Coleorton Brook at New Packington culvert, has the potential to cause a moderate impact on the hydromorphology of this watercourse, which is a moderate value receptor. This would result in a moderate adverse effect, which would be significant.

Groundwater

Aquifers

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

Abstractions

15.4.34 The assessment has not identified any permanent significant effects on groundwater abstractions.

Water dependent habitats

15.4.35 Measham Road Packington cutting would have the potential to cause a minor impact on the hydromorphology of Gilwiskaw Brook due to permanent active draining measures changing groundwater levels. Following construction works it is very likely that the change in ground water distribution would not replicate the preconstruction scenario. Gilwiskaw Brook is a very high value receptor; thus, this impact would potentially result in a moderate adverse effect, which is significant. Details of the significance of this impact on this site is provided in Section 7, Ecology and biodiversity.

15.4.36 The Proposed Scheme is not anticipated to permanently impact groundwater flow or quality at Saltersford Wood LNR, therefore there is no anticipated hydrological impact on this site.

15.4.37 The realignment of the Gilwiskaw Brook under the Gilwiskaw Brook viaduct at Packington has the potential to result in a minor impact on the hydromorphology of the River Mease SAC and SSSI. Details of the significance of this impact on this site is provided in Section 7, Ecology and biodiversity.

Permanent effects - flood risk and land drainage

15.4.38 With the provision of replacement floodplain storage areas along the route of the Proposed Scheme, no permanent effects have been identified in relation to fluvial flood risk in the study area.

Other mitigation measures

15.4.39 Additional mitigation measures to further reduce the temporary and permanent impacts of construction stage activities, where there is potential for the Proposed Scheme to result in significant effects are described in the sections below.

Surface water

15.4.40 The embedded mitigation proposed in the design of the localised realignment of Gilwiskaw Brook and tributary 2 of Coleorton Brook will be developed further in consultation with the Environment Agency and LLFA. Monitoring will be undertaken to ensure successful establishment of the mitigation proposals developed.

15.4.41 The positioning of piers for the River Mease will be carefully managed to maximise the distance between the watercourse banks and the pier, and where necessary, scour protection mitigation will be developed to manage erosion. Hydromorphological mitigation will be considered up and downstream of the pier locations to enable erosion patterns to re-stabilise as a result of any scour protection.

Groundwater - surface water interactions

15.4.42 Additional mitigation measures for the management of groundwater baseflows to the Gilwiskaw Brook during dewatering for the construction of Measham Road Packington cutting may be required. Mitigation measures will be designed in detail following ground investigation and monitoring of surface water and groundwater levels.

15.4.43 Any such additional measures will be designed in consultation with the Environment Agency.

Summary of likely residual significant effects

15.4.44 In the absence of the other mitigation measures set out above, the Proposed Scheme would potentially result in residual significant effects as follows:

- a moderate adverse effect related to the positioning of the viaduct piers on the hydromorphology of the River Mease floodplain, which is significant;
- a moderate adverse effect related to Measham Road Packington cutting on the hydromorphology of Gilwiskaw Brook, which is significant;
- a moderate adverse effect related to the realignment of Gilwiskaw Brook under Gilwiskaw Brook viaduct on the hydromorphology of the brook, which is significant; and
- a moderate adverse effect related to the realignment under New Packington culvert on the hydromorphology of tributary 2 of Coleorton Brook, which is significant.

It is currently anticipated that it should be possible to develop the means of mitigating these impacts, to ensure that there are no residual significant effects arising from construction of the Proposed Scheme.

15.5 Effects arising from operation

Avoidance and mitigation measures

15.5.1 The principal issue of concern during operation of the Proposed Scheme is the potential for accidental spillages to occur that could result in the release of contaminants into the water environment. This issue has been assessed on a route-wide basis in Volume 3: Route-wide effects, where the mitigation measures associated with this risk are described. A draft operation and maintenance plan for water resources and flood risk will be provided in the formal ES.

15.5.2 The design takes into account the policies in the NPPF and will aim to ensure that the Proposed Scheme is safe from flooding without increasing flood risk elsewhere. Evidence of application of the Sequential Test and Exception Tests in the NPPF is provided on a route-wide basis in Volume 3: Route-wide effects.

15.5.3 Sustainable drainage systems will be used where reasonably practicable. These will help to remove any suspended material within runoff from the Proposed Scheme through filtration, vegetative adsorption or settlement. The drainage systems proposed will aim to ensure that the quantity and quality of water draining from the Proposed Scheme during its operational phase would have a negligible impact on the water environment.

15.5.4 A summary of the route-wide WFD compliance assessment process is provided in Volume 3: Route-wide effects. This describes the ongoing assessment process and how measures will be embedded into the design that are specifically designed to ensure that the Proposed Scheme complies with the requirements of the WFD, where reasonably practicable. It is currently anticipated that the Proposed Scheme will be compliant with WFD legislation.

Assessment of impacts and effects

15.5.5 There are considered to be no significant adverse effects related to water resources and flood risk arising from operation of the Proposed Scheme.

Other mitigation measures

15.5.6 There are considered to be no further measures required to mitigate adverse effects on surface water resources, groundwater resources or flood risk.

Summary of likely residual significant effects

15.5.7 The assessment shows that there would be no residual significant effects on surface water, groundwater or flood risk during operation of the Proposed Scheme.

Monitoring

15.5.8 Volume 1, Section 9 sets out the general approach to monitoring of water resources and flood risk during operation of the Proposed Scheme.

15.5.9 There are no area-specific requirements for monitoring water resources and flood risk during operation of the Proposed Scheme.

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