

High Speed Rail (West Midlands - Crewe)

Environmental Statement

Non-technical summary



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Department for Transport

High Speed Two (HS2) Limited,
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA

Telephone: 08081 434 434

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.gov.uk/hs2

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

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Foreword

High Speed Two (HS2) is a new high speed railway proposed by the Government to connect major cities in Britain. It will be built in phases. Phase One comprises the first section of the HS2 rail network of approximately 143 miles (230 kilometres (km)) between London and the West Midlands that will become operational in 2026. The High Speed Rail (London - West Midlands) Act received Royal Assent in February 2017 and initial works have commenced.

Phase Two of HS2 will extend the line to the north-west and north-east: to Manchester with connections to the West Coast Main Line at Crewe and Golborne, and to Leeds with a connection to the East Coast Main Line approaching York, completing what is known as the 'Y network'.

Phase Two will be constructed in two phases:

- Phase 2a (the Proposed Scheme): the western section of Phase Two between the West Midlands and Crewe, comprising approximately 36 miles (58km) of HS2 main line (including the section which would connect with and form the first part of Phase 2b) and two spurs (approximately 4 miles, 6km) south of Crewe. The spurs will allow

trains to transfer between the HS2 main line and the West Coast Main Line. Construction of the Proposed Scheme will commence in 2020, ahead of the rest of Phase Two, with operation planned to start in 2027; and

- Phase 2b: comprising the remainder of Phase Two, between Crewe (where it would connect with the Proposed Scheme) and Manchester, and between the West Midlands and Leeds, with connections to the West Coast Main Line at Golborne and to the East Coast Main Line approaching York. Construction is expected to start in 2023 and operation is planned to start by 2033.

The Government is now promoting legislation for the Proposed Scheme: the High Speed Rail (West Midlands – Crewe) Bill. If enacted by Parliament, the Bill will provide the powers to construct, operate and maintain Phase 2a of HS2. It will grant 'development consent' for that project.

As required by law and Parliamentary rules, the Government has provided Parliament with a detailed statement assessing the likely significant effects of the Proposed Scheme on the environment - an Environmental Statement (ES). This document is the Non-Technical Summary

(NTS) of the ES. Parliamentary rules allow a period of at least eight weeks (56 days) for members of the public and any other interested parties to send any comments they may have on the ES to the Secretary of State for Transport. Details of the closing date for comments and the address to which you should send your comments have been posted on the HS2 Ltd website (www.gov.uk/hs2).

The Secretary of State for Transport will publish all comments received on the ES and submit them to an independent assessor to be appointed by Parliament. The independent assessor will prepare a report summarising the issues raised by the comments made on the ES.

The ES (including this NTS), all comments received by the Secretary of State on the ES and the independent assessor's report will be available to Members of Parliament in advance of the date fixed for the Second Reading debate on the Bill for Phase 2a (the Proposed Scheme) in the House of Commons.

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1. Introduction

This is the Non-Technical Summary (NTS) of the Environmental Statement (ES), which the Government has submitted to Parliament in support of the High Speed Rail (West Midlands – Crewe) Bill 2017.

The proposed HS2 network

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, and the East Midlands will be served by high speed trains running at speeds of up to 225 miles per hour (mph) (360 kilometres per hour (kph)). Trains will also run beyond the HS2 network to serve destinations including South Yorkshire, Liverpool, Glasgow, Edinburgh, Newcastle and York.

HS2 will be built in Phases. Phase One comprises the first section of the HS2 rail network of approximately 143 miles (230 kilometres (km)) between London and the West Midlands and is planned to become operational in 2026. It was the subject of an ES deposited with the High Speed Two (London – West Midlands) Bill in 2013. Supplementary ES were deposited with Additional Provisions to that Bill in 2014 and 2015. The High Speed Rail (London - West

Midlands) Act 2017 authorises the construction and operation of the Phase One scheme. Initial works on Phase One have commenced.

Phase Two of HS2 will extend the line to the north-west and north-east: to Manchester with connections to the West Coast Main Line at Crewe and Golborne; and to Leeds with a connection to the East Coast Main Line approaching York.

Phase Two will be constructed in two phases:

- Phase 2a (the Proposed Scheme): the western section of Phase Two between the West Midlands and Crewe, comprising approximately 36 miles (58km) of HS2 main line (including the section which would connect with and form the first part of Phase 2b) and two spurs (approximately 4 miles, 6km) south of Crewe. The spurs will allow trains to transfer between the HS2 main line and the West Coast Main Line. Construction of the Proposed Scheme will commence in 2020, ahead of the rest of Phase Two, with operation planned to start in 2027; and

- Phase 2b: comprising the remainder of Phase Two, between Crewe (where it would connect with the Proposed Scheme) and Manchester, and between the West Midlands and Leeds, with connections to the West Coast Main Line at Golborne and to the East Coast Main Line approaching York. Phase 2b will be the subject of a separate hybrid Bill. Construction is expected to start in 2023 and operation planned to start by 2033.

Phase One and Phase Two, once constructed will form what is known as the Y network (see Figure 1).

The Proposed Scheme will connect with Phase One at Fradley, to the north-east of Lichfield, and connect to the West Coast Main Line, south of Crewe, enabling high speed trains to call at Crewe Station and to provide onward services beyond the HS2 network, and between the north-west of England and Scotland.

The Proposed Scheme – Phase 2a of HS2

In two reports, *HS2 Plus* and *Rebalancing Britain*, Sir David Higgins recommended accelerating the section of the Phase Two route between the West Midlands and Crewe. By opening the section of Phase Two to Crewe by 2027 instead of 2033, more of the benefits of HS2 will be brought to the North sooner than originally planned. In the November 2015 Command Paper *High Speed Two: East and West, The Next Steps to Crewe and Beyond*, the Government announced its intention to bring forward the route between the West Midlands and Crewe, and set out the preferred line of route for the Proposed Scheme.

The Proposed Scheme is the subject of this ES. The ES comprises a suite of documents that describe the Proposed Scheme, the reasonable alternatives studied, the environmental baseline, an assessment of the likely significant beneficial and adverse effects, and mitigation and monitoring measures. It also includes a description of consultation and engagement undertaken to inform the design and assessment of the Proposed Scheme.

The route of the Proposed Scheme has been divided into five community areas, for environmental assessment and community engagement purposes. These are shown in Figure 2.

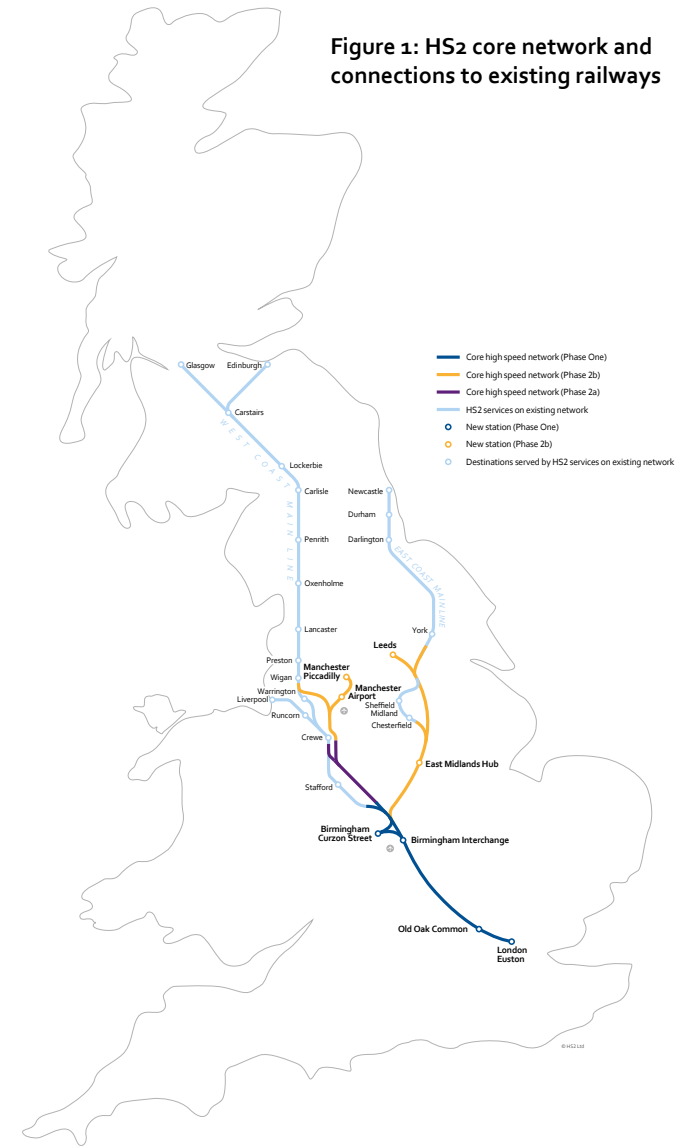
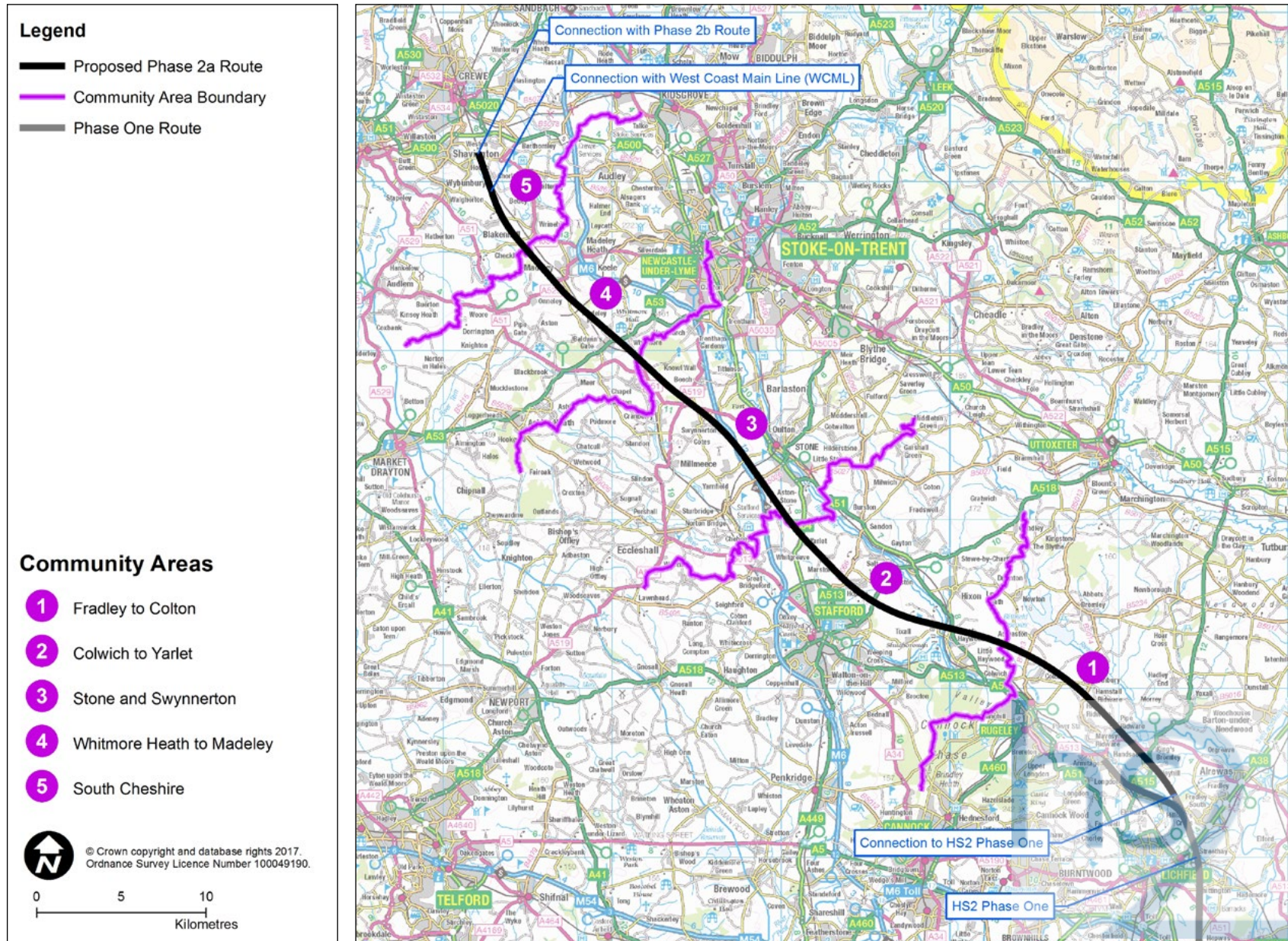


Figure 2: Phase 2a route showing community areas



Development consent for Phase 2a of HS2 – the hybrid Bill

The Government has decided that it should obtain development consent for Phase 2a of HS2 by primary legislation - an Act of Parliament. Use of primary legislation rather than promoting a development consent order under the Planning Act 2008 allows the Government to seek the full range of statutory powers and authorisations that a project of this size and complexity requires. This includes revisions to the rail regulatory regime and the planning regime and provisions to enable the making of subsequent orders and regulations by way of statutory instrument. The Government followed the same approach for Phase One of HS2, as well as for the Channel Tunnel Rail Link (now HS1) and the Elizabeth line (formerly Crossrail).

The Government's Bill for Phase 2a of HS2 is a 'hybrid' Bill. In practice, this means that persons whose property or interests are directly and specially affected by the hybrid Bill are able to petition Parliament and to present their case to a Select Committee of Members of Parliament.

Such persons include those whose properties are to be compulsorily purchased for the Proposed Scheme. Local authorities situated along the route of the Proposed Scheme are able to petition on behalf of their local communities. The Select Committee then reports to the House of Commons. A similar procedure applies in the House of Lords. In other respects, a hybrid Bill proceeds essentially in the same way as a Government Bill.

Phase 2a of HS2 – Environmental Statement

As required by law and Parliamentary rules, the hybrid Bill is accompanied by a detailed statement assessing the likely significant effects of the Phase 2a Proposed Scheme on the environment in the form of the ES.

The ES includes the following documents:

- **This Non-Technical Summary (NTS).** The NTS provides a summary in non-technical language of the Proposed Scheme, the reasonable alternatives studied and its likely significant residual effects on the

environment. The NTS summarises those features of the design and other measures included in the Proposed Scheme in order to avoid, prevent or reduce likely significant adverse effects. Residual effects are those significant environmental effects of the Proposed Scheme, which are likely to remain after those measures are in place. The NTS also outlines the monitoring measures to manage the effects of construction and the effectiveness of mitigation post construction, as well as appropriate monitoring during operation, where appropriate;

- **Glossary of terms and list of abbreviations.** This contains terms and abbreviations, including units of measurement used throughout the ES documentation;
- **Volume 1: Introduction and methodology.** Volume 1 provides an overview of HS2, the environmental impact assessment (EIA) process and the approach to consultation and engagement. It gives details of the permanent features of the Proposed Scheme and general construction techniques. It summarises the scope and methodology

for the environmental topics. Volume 1 outlines the approach to mitigation and 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). Volume 1 also provides a summary of the reasonable alternatives studied (including local alternatives studied prior to the November 2015 route announcement). Local alternatives studied post November 2015 are discussed in the relevant Volume 2 community area reports;

- **Volume 2: Community area reports and map books.**

Volume 2 consists of five community area reports together with maps, which provide a description of the Proposed Scheme at a local level. For each community area, these reports present an overview of the area, a description of the construction and operation of the Proposed Scheme within the area, a description of the environmental baseline, and the assessment of the likely significant effects of the Proposed Scheme on the environment. They provide a summary of the local alternatives studied since November 2015 and explain the design and mitigation measures

included in the Proposed Scheme in order to avoid, prevent or reduce likely significant adverse environmental effects. The reports also outline measures to monitor the effects of the Proposed Scheme on the environment;

- **Volume 3: Route-wide effects.**

Volume 3 describes the likely significant environmental effects of the Proposed Scheme at a geographical scale greater than the community areas described in Volume 2;

- **Volume 4: Off-route effects.**

Volume 4 provides an assessment of the likely significant environmental effects of the Proposed Scheme at locations beyond the Phase 2a route corridor and its associated local environment together with a map book; and

- **Volume 5: Appendices and map books.**

Volume 5 contains supporting technical information and associated map books to be read in conjunction with the other volumes of the ES.

Background information and data

Certain reports and maps containing background information and data have been produced, which do not form part of the ES. These documents are available on the HS2 website. The Background Information and Data reports and maps present relevant survey information, collated from published and unpublished sources, and other relevant background material.

1.1 Approach to the environment

Environmental considerations have been key to the development of the Proposed Scheme in route selection, design development and arrangements for construction and operation of the railway. In developing the Proposed Scheme, HS2 Ltd's aim has been twofold: to take advantage of the opportunities and benefits offered by the Proposed Scheme and to mitigate the adverse environmental effects of the Proposed Scheme as effectively as reasonably practicable.

The Government's announcement on the accelerated Phase 2a scheme in November 2015 included a sustainability report (*Sustainability Report Phase Two Post-Consultation Update: West Midlands to Crewe*), which set out the potential environmental impacts of the preferred scheme, in particular describing how the potential impacts compared with the scheme as presented at

consultation in 2013. HS2 Ltd has continued to develop and refine the design to reduce its environmental effects, to resolve engineering issues and to improve value for money.

The Government recognises that the Proposed Scheme will have significant effects on those who live close to the route and upon the local environment through which it will pass. Since 2015, HS2 Ltd has engaged with local communities and landowners along the route of the Proposed Scheme and with other stakeholders to identify and seek to resolve issues of concern, as described in Section 1.2 of this NTS.

The ES includes a description of the measures proposed in order to avoid, prevent or reduce likely significant adverse effects. It also describes measures to manage and monitor the adverse effects of the Proposed Scheme on the environment. HS2 Ltd's approach to mitigating

adverse effects and monitoring of the Proposed Scheme on the environment is described in Section 7 of this NTS. HS2 Ltd's aim is to ensure that, during construction and operation of the Proposed Scheme, significant adverse environmental effects will either be avoided or mitigated as far as reasonably practicable.

As with Phase One, the Secretary of State for Transport will establish a set of controls known as Environmental Minimum Requirements (EMR) to ensure that the environmental effects of the Proposed Scheme generally do not exceed those reported in the ES. The EMR are described in Section 5.3 of this NTS.

1.2 Engagement and consultation

Stakeholders with whom HS2 Ltd has consulted and engaged during the development of the design of the Proposed Scheme include:

- directly affected individuals and land and business owners – the engagement and consultation focused on directly affected individuals, such as those whose operations, land and/or property will be directly affected by the Proposed Scheme whether permanently or temporarily. They include individual property and land owners, commercial and educational entities, such as Staffordshire County Showground and charitable organisations such as the Conservation, Horticulture, Agriculture for the Disabled Society at Handsacre. They also include farmers and growers and their representatives. This consultation and engagement has enabled HS2 Ltd to gain a more detailed understanding of the land or property affected and to provide those affected with the opportunity to raise issues and discuss potential impacts and mitigation in relation to the Proposed Scheme;
- communities – community stakeholders along the route include local authorities, a range of local interest groups, local facility and service providers, schools and educational establishments (including Rugeley School, which is linked to Mayfield Children’s Home) and parish councils. Engagement with these stakeholders has given affected communities the opportunity to raise issues and opportunities in relation to the Proposed Scheme;
- technical and specialist groups – to obtain appropriate specialist input in order to inform the design and assessment of the Proposed Scheme, including baseline information and information for individual technical assessments. These groups include:
 - statutory bodies: including the Environment Agency, Natural England, Historic England, Department for the Environment, Food and Rural Affairs, Food and Environment Research Agency, Network Rail and Highways England;
 - local authorities;
 - utility companies; and
 - other specialist stakeholders including the Woodland Trust, Staffordshire Wildlife Trust, Cheshire Wildlife Trust, Canal & River Trust, and the National Trust.

A variety of mechanisms have been used to ensure an open and inclusive approach to engagement and consultation, reflecting the differing requirements and expectations of stakeholders. Engagement and consultation has helped to inform the design and assessment of the Proposed Scheme, which is reported in the ES.

HS2 Ltd published a draft EIA Scope and Methodology Report for consultation in March 2016, outlining the proposed scope and methodology for the EIA of the Proposed Scheme. This report was issued to statutory bodies, non-government organisations, local authorities and parish councils, and was made available on the Government's website, allowing comment by local interest groups and the public. The consultation period ended in May 2016 and the consultation responses informed the EIA Scope and Methodology Report, published in September 2016, and the Scope and Methodology Report Addendum (available in Volume 5 of this ES).

From 13 September to 7 November 2016, public consultation took place on the working draft EIA Report (including an early draft of the Code of Construction Practice) providing the opportunity for feedback on the ongoing design of the Proposed Scheme and the assessment undertaken at that time.

In parallel, the Government consulted on three design refinements to the published November 2015 scheme. These were set out in HS2 Phase 2a: West Midlands- Crewe Design Refinement Consultation and are as follows:

- extending the Crewe tunnel shown in the November 2015 scheme south by approximately 1.3 miles (2.1km) and re-siting the tunnel portal south of the A500 and Weston Lane;
- moving the spur lines that will connect the Proposed Scheme to the West Coast Main Line south of Crewe approximately 1.2 miles (2km) further south and also extending their length; and
- building a temporary construction facility (railhead) between the proposed HS2 route and the M6 near Stone, with the potential that its use could then be changed to become a permanent maintenance facility (see Section 3 for more information on the maintenance facility and Section 4 for more information

on the railhead). This would replace the permanent maintenance facility proposed at Crewe in the November 2015 scheme and shown in the working draft EIA Report. Locating both the temporary railhead and permanent maintenance facility on the same site will reduce the cost and environmental impact. Siting the maintenance facility at this location also removes the need for maintenance loops at Pipe Ridware in the Fradley to Colton community area.

To support these consultations, a number of events were conducted in local areas along the route of the Proposed Scheme. These events were held on:

- 30 September 2016: Whitmore and District Village Hall;
- 5 October 2016: Kings Bromley Village Hall;
- 7 October 2016: Great Haywood Memorial Hall;
- 10 October 2016: Stafford Gatehouse Theatre;

- 12 October 2016: Yarnfield Park, Stone;
- 15 October 2016: The Madeley Centre; and
- 19 October 2016: Wychwood Park, Weston.

HS2 Ltd has considered responses to these consultations in developing the Proposed Scheme and undertaking the EIA. The responses have informed the compilation of the ES and the draft Code of Construction Practice published with the ES.

A working draft EIA Report Consultation Summary Report explaining how responses have been considered through the development of the Proposed Scheme and the EIA has been published as part of this ES.

The Government's response to the design refinement consultation has been published separately in *High Speed Two Phase 2a: West Midlands to Crewe Government response to the Design Refinement Consultation*.

Arrangements for public participation and comment on the ES are summarised in the foreword to this NTS.

2. The case for HS2

2.1 The need for high speed rail

The Government is committed to building a stronger, more balanced economy capable of delivering lasting growth and widely shared prosperity. For rail transport, the Government has stated the following key objectives:

- to provide sufficient capacity to meet long-term demand;
- to improve connectivity by delivering better journey times and making travel easier; and
- to improve resilience and reliability across the network.

The Government's case for a new high speed rail network is primarily to ensure that the inter-urban rail network supports the economic development of the country by providing sufficient capacity and improved connectivity between urban centres. This will help to build a stronger, more balanced economy, capable of delivering growth and economic benefits.

The Government's view is that further incremental upgrades to the existing rail network will be insufficient to provide the necessary capacity and improved performance required to meet the country's long-term economic needs and would result in prolonged and unacceptable disruption to the existing network. Therefore, a new railway is needed.

The Government has concluded that building a new conventional railway line would not be significantly cheaper than a new high speed line, nor would its effects on the environment and communities be significantly less than those of high speed rail. A conventional railway line would deliver far fewer benefits in terms of enhanced connectivity and support for long-term economic growth. The Government also considers that high speed rail would have greater potential to attract travellers from air and road transport, creating opportunities to reduce carbon emissions.

2.2 Enhancing capacity and connectivity

Demand for rail travel in Britain is increasing. It is the Government's view that even major enhancement packages to existing railway lines cannot provide sufficient rail capacity between London, the Midlands and the North over the coming decades. The Government has concluded that a new line must be built. Such a line will provide new, fast, long-distance services and release significant capacity on existing routes, such as the West Coast Main Line, which could be redistributed to benefit both passenger and freight movements.

In addition to the gain in capacity, enhanced connectivity is one of the key objectives of HS2, delivering wider transport choice and reduced journey times that will translate into long-term economic benefits.

2.3 Generating growth

Efficient movement of people and freight is essential for economic growth as enhanced capacity and good connectivity strengthen the links between businesses, workers and customers and remove geographical barriers to markets. The ability of rail to provide direct connections into urban centres makes it a particularly effective means of moving large numbers of people into and between urban areas. The extension of the high speed rail network to the north of England reflects the Government's intention that the regional benefits of high speed rail travel are distributed as widely as possible.

2.4 The case for Phase 2a

Accelerating the delivery of Phase 2a will:

- deliver faster journeys between London, Crewe, Manchester, Liverpool, Preston, Warrington, Wigan and Glasgow sooner, by allowing long-distance trains to run further on high speed track to Crewe before re-joining the conventional network (as opposed to the connection at Handsacre). Phase 2a will therefore deliver further journey time savings in addition to those already to be

delivered by Phase One (see Table 1 for total journey time savings for key destinations);

- allow passengers travelling to or from a wide range of places to connect onto HS2 services given that Crewe is already a major hub on the rail network with regional and long-distance connections to the wider North West, East Midlands, and North and South Wales;
- mean that the North West and Scotland will see more of the benefits of HS2 more quickly, and this will bring economic benefits sooner, helping to rebalance the economy.

Some of these economic benefits will come from businesses being more accessible to one another as well as offering improved accessibility to labour markets, and benefiting the overall level of labour supply; and

- relieve pressure on bottlenecks on the existing West Coast Main Line at Colwich Junction and around Stafford, which will improve the reliability and performance on the existing main line.

Table 1: Fastest typical journey times between key destinations 'without' and 'with' the Proposed Scheme in operation (Phase One and Phase 2a)

Origin/ destination	Journey time		
	Without HS2 (i.e. current)	With HS2 Phase One	With HS2 Phase One and the Proposed Scheme
London Euston - Crewe	1 hour 30 minutes	1 hour 8 minutes	55 minutes
London Euston - Manchester Piccadilly	2 hours 7 minutes	1 hour 41 minutes	1 hour 30 minutes
London Euston - Preston	2 hours 8 minutes	1 hour 41 minutes	1 hour 30 minutes
London Euston - Liverpool Lime Street	2 hours 14 minutes	1 hour 46 minutes	1 hour 34 minutes
London Euston - Glasgow Central	4 hours 31 minutes (and one fast train per day: 4 hours and 5 minutes)	3 hours 56 minutes	3 hours 45 minutes

2.5 Climate change

The Proposed Scheme has been developed against a background of concern and strengthening policy regarding climate change. This includes consideration of both the need to mitigate climate change through reductions in greenhouse gas emissions, and the need for critical infrastructure and environments to be resilient to future climate change impacts and risks.

The Climate Change Act 2008 requires at least an 80% reduction in the UK's greenhouse gas emissions as compared to 1990 levels by 2050. To ensure that regular progress is made towards the target, the Climate Change Act established a system of carbon budgets.

In July 2016, the Government published the Carbon Budget Order 2016. This requires a reduction of UK greenhouse gas emissions by 2030 of 57% relative to 1990 levels. In order to meet this target, key priorities for the transport sector – as recommended by the Committee on Climate Change – are ensuring that carbon efficiency of conventional road vehicles continues

to improve, as well as increasing the use of electrical vehicles and encouraging a behavioural change towards 'smarter choices' such as the use of more public transport. It is expected that the Government will publish a plan for meeting the legislated carbon budgets in the second half of 2017.

In terms of enhancing inter-urban connectivity, high speed rail is one of the most carbon efficient means of transporting large numbers of people, measured in terms of emissions per passenger kilometre. High speed rail is considered to draw an optimum balance between carbon reduction and economic benefits. Furthermore, the carbon emissions of high speed rail are likely to reduce in future as the energy supply is decarbonised,

as Britain moves away from using gas, oil and coal-fired power stations and towards renewable and low-carbon sources of energy. There is a large carbon benefit associated with the operation of Phase One of HS2. The operation of the Proposed Scheme will provide some additional carbon benefits through modal shift (such as shifting from road vehicles to trains) of passengers and freight. Further carbon benefit is expected to be achieved when the entire HS2 network is fully operational.

3. Description of the Phase 2a scheme

3.1 The route

The Proposed Scheme will comprise a high speed railway line between the end of the Phase One route at Fradley and Crewe. It will run north-east of Stafford and south-west of Stone, passing through a mainly rural area in Staffordshire and Cheshire East, where a number of small settlements are located.

The route of the Proposed Scheme will connect with the Manchester spur that forms part of Phase One at Fradley, to the north-east of Lichfield. It will continue northwards across the River Trent floodplain, over a series of embankments and viaducts, passing south-east of Kings Bromley over Bourne Brook, the A515 Lichfield Road and the A513 Rugeley Road on viaduct. The route will continue over the River Trent and will run 500m west of Blithbury through multiple cuttings. It will then pass between the villages of Stockwell Heath and Colton and over Moreton Brook on viaduct.

The route will continue in cutting with a retaining wall past Mayfield Children's Home, which occupies the Grade II listed Moreton House, and emerge onto embankment.

The route will cross the A51 Lichfield Road and will run on viaduct over the existing Macclesfield to Colwich Line, adjacent to the Great Haywood Marina, cross the Trent and Mersey Canal and then cross the River Trent, for a second time. The route will then continue on embankment, crossing Lionlodge Covert, an area of deciduous woodland and designated Local Wildlife Site.

The route will run adjacent to Ingestre Park and through Ingestre Park Golf Club in cutting, with Pasturefields Salt Marsh Special Area of Conservation and Site of Special Scientific Interest approximately 900m to the north. The route will then run through an area used for car parking and camping in the southern part of Staffordshire County Showground in cutting, passing under the A518 Weston Road. It will then continue through Hopton passing through a false cutting behind a landscaped retaining wall and will then continue in cutting. The route will then pass Marston on embankment, and continue past Yarlet in cutting running beneath the A34 Stone Road.

The route will continue on a series of embankments and cuttings, broadly following the M6 and crossing Filly Brook and the Norton Bridge to Stone Railway on viaduct.

The route will then cross Yarnfield Lane, where an infrastructure maintenance facility referred to as the Stone infrastructure maintenance base - rail (IMB-R) will be located. Railway access tracks to connect the route with the infrastructure maintenance facility will run along the western side of the route, with a connection to the Norton Bridge to Stone Railway. The route will then cross the M6 on viaduct near Stone and Yarnfield.

The route will pass to the north of Swynnerton on an embankment. Continuing north, the route will pass Swynnerton Old Park in cutting, passing under the A519 Newcastle Road. It will continue into the Meece Valley on embankment and then cross Meece Brook on viaduct, before passing through higher ground, west of Whitmore.

The route will pass under the A53 Newcastle Road to the south-east of Whitmore Heath, where it will enter a short section of cut-and-cover tunnel. This will be followed by a twin bore tunnel under the settlement of Whitmore Heath. The route will pass through Whitmore Wood in cutting with a retaining wall on the north-east side to reduce the loss of ancient woodland. The route will enter the River Lea valley on an embankment, then cross the West Coast Main Line, the Stoke to Market Drayton Railway (also

known as the Silverdale Line), the River Lea and the Madeley Chord Railway on viaduct. The route will then continue on embankment, passing several historical heritage assets, including the Grade II listed Hey House and Old Madeley Manor Scheduled Monument.

The route will continue towards the village of Madeley passing under the A525 Bar Hill Road before entering a twin bore tunnel, at Barhill Wood. North of Madeley the route will continue in a shallow cutting before crossing the River Lea and associated floodplain and Checkley Brook on a viaduct.

The route will then run on embankment before going into a shallow cutting, passing under Checkley Lane and will then continue northwards crossing over Den Lane.

The route will then continue in cutting and will pass under the realigned Newcastle Road before terminating at a headwall in the Crewe South portal. This will form the boundary between the Proposed Scheme and Phase 2b.

HS2 spurs

As well as the main Phase 2a route, the Proposed Scheme will also include two spurs that will allow trains to transfer between the HS2 main line and the existing West Coast Main Line northbound towards Crewe (northbound spur) and southbound towards London (southbound spur).

The spurs will diverge from the HS2 main line on both sides at the point where the HS2 main line passes into the Crewe south cutting, to the north-east of Grange Farm. The southbound spur will initially run along the east side of the HS2 main line and the northbound spur will initially run along the west side.

The northbound spur will then cross over the HS2 main line and the two spurs will then converge on the east side of the HS2 main line, 500m north of the Blakenhall viaduct. The spurs will continue together for 3km before connecting into the existing West Coast Main Line, 200m north of the Newcastle Road overbridge.

To facilitate the connection of the spurs to the West Coast Main Line, modifications will be required to the existing West Coast Main Line infrastructure in the South Cheshire area. This will include a new section of the West Coast

Main Line to incorporate the realignment of an existing northbound track along this line and an extension of the existing connection lines to the Basford Hall sidings.

A number of rail systems modifications will also be required along the West Coast Main Line and to enable the construction of a new island platform at Crewe Station. This will include new track works, realignment of existing tracks, new switches and crossings, the relocation or addition of overhead line equipment, and modifications to signalling, telecommunications, power and other related equipment.

New platform at Crewe Station

To accommodate additional rail services at Crewe Station, the existing Cardiff to Manchester Piccadilly services will be diverted via the Manchester Independent Lines tunnel at Crewe. A new platform will be constructed at Crewe Station to accommodate this service.

Modifications to the West Coast Main Line to the north of Crewe

Additional modifications will be required to the West Coast Main Line to the north of Crewe at Maw Green and Sandbach. This includes railway

systems modifications and reconfiguration of track layouts.

Land required

The land required for the Proposed Scheme will include:

- the operational rail corridor (which includes any land for permanent maintenance facilities);
- land for mitigation (including earthworks, landscape planting and new ecological habitats);
- land required to divert or realign some roads, public rights of way, utilities and watercourses; and
- land required for construction activity, including: storage of excavated materials and soils, site compounds; worker accommodation sites; borrow pits; and temporary diversion of roads, public rights of way, private access routes and for permanent access to the railway for maintenance purposes.

Land required only for construction activity will normally be restored to its previous ownership and use following completion of the Proposed Scheme construction phase.

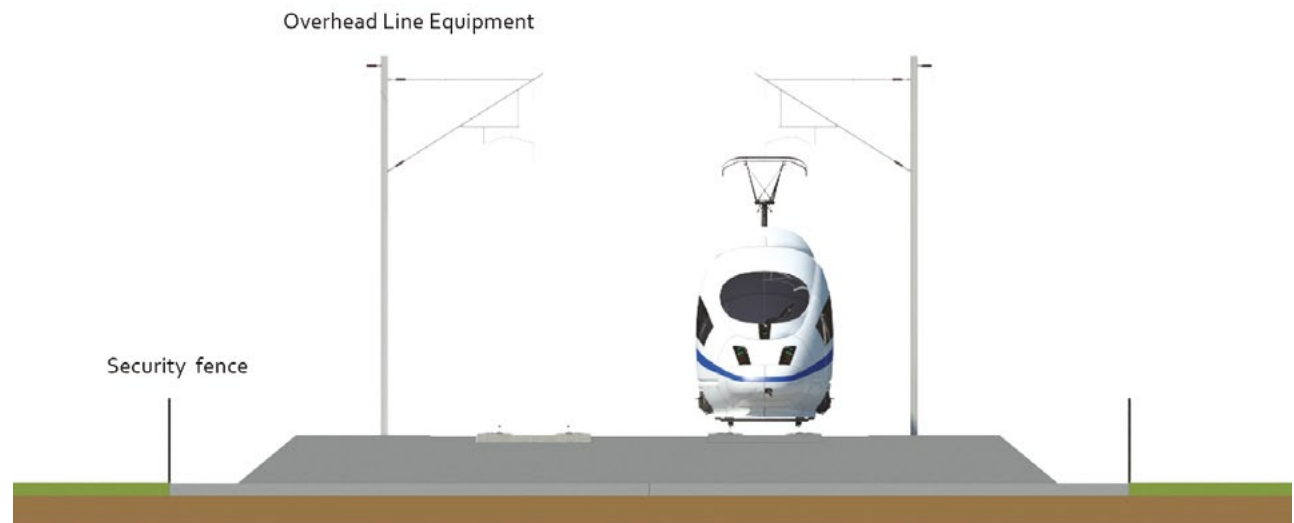
Railway corridor

In most locations the route of the Proposed Scheme will accommodate two railway tracks, one for northbound and one for southbound services. The rail corridor will also include other features including: signalling; telecommunication and overhead line equipment; electricity cables; railway drainage; and access tracks. The width of the railway corridor will vary along its length in order to accommodate the existing ground, cuttings, embankments and tunnels.

In addition, some sections of the railway corridor will be wider to accommodate more than two tracks, for example, on sections of the route where different railway lines converge and on the approach to the maintenance facility. The railway will be continuously fenced along the length of the rail corridor. The type of fencing used at each location will depend on the functional requirements and its context, for example, whether it is in a rural or urban setting.

An indicative cross-section through a two-track rail corridor at ground level is shown in Figure 3.

Figure 3: Indicative two-track rail corridor



3.2 Other components of the Proposed Scheme

Bridges and viaducts

Bridges or viaducts will be used where the route will cross an existing feature, such as a public right of way, road, river, floodplain or existing railway. Viaducts are constructed where embankments would not be a practicable or effective solution (an example of a viaduct is shown in Figure 4). The height of the bridges and viaducts is determined by the route alignment, surrounding ground levels and the feature being crossed.

Green bridges have been included as part of the Proposed Scheme and will be provided where necessary in order to maintain habitat connectivity, and to enable the safe movement of animals. Typically, these bridges will be multi-functional and provide other types of access such as footpath, road or agriculture as their primary purpose. A green bridge includes an increased width to allow vegetation, typically including one or two hedgerows comprising a range of local or native species.

Some underbridges will provide ecological connectivity through their design and planting approach.

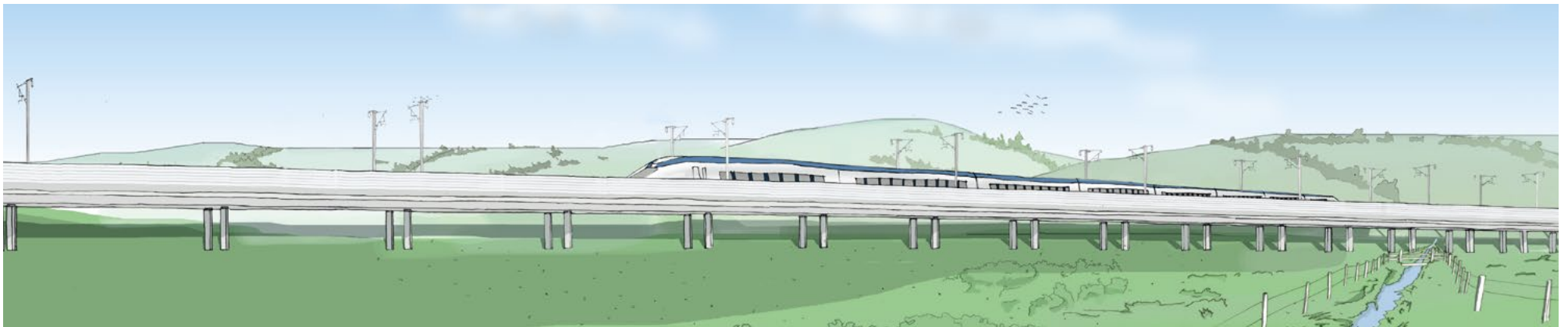
Tunnels

Two tunnels will be constructed along the route.

A tunnel is proposed at Whitmore Heath. The tunnel will be bored beneath the settlement of Whitmore Heath for a distance of 690m. A further section of 240m will be constructed as a cut-and-cover tunnel to the south of Whitmore Heath. There will also be a bored tunnel to the west of Madeley, which will be 670m long. Both tunnels will be located in the Whitmore Heath to Madeley community area.

Bored tunnels will be created using a tunnel boring machine and will comprise two parallel tunnels, each containing a single rail track.

Figure 4: Viaduct (generic)



Cut-and-cover tunnel construction requires temporary disruption at the surface while the tunnel is constructed by excavating downwards, building a structural box and then restoring the land over the top.

All tunnels will have portals at each entry and exit. Portals will take different forms, depending on local topography, ground conditions and train

speeds. Porous portals will be provided to allow the passage of air from the tunnels in order to reduce air pressure changes and noise effects when trains enter or leave tunnels. The porous portals will be in the order of 150m long.

An example of a cut and cover tunnel portal is shown in Figure 5.

For safety reasons, tunnels longer than approximately 0.6 miles (1km) are required to have cross-passage escape routes between individual tunnel bores and to the surface. Cross passages between tunnels will be mined. These are excavated in stages, with excavated faces stabilised with sprayed concrete and other supporting measures.

Figure 5: Cut and cover tunnel portal (generic)

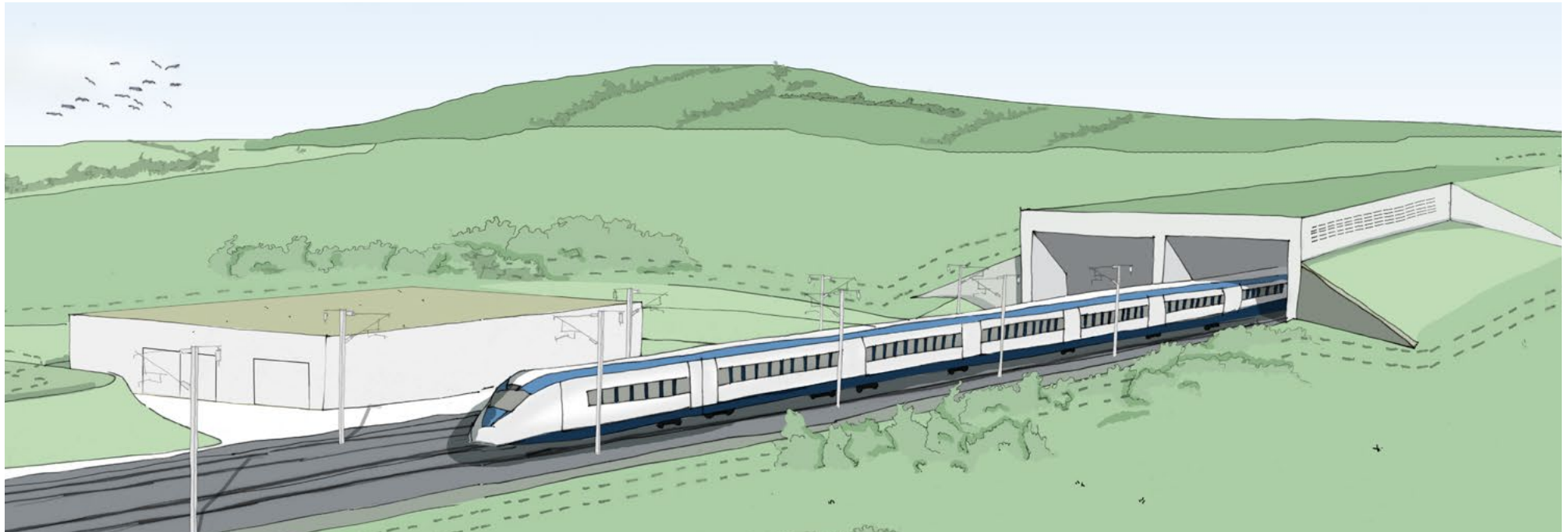
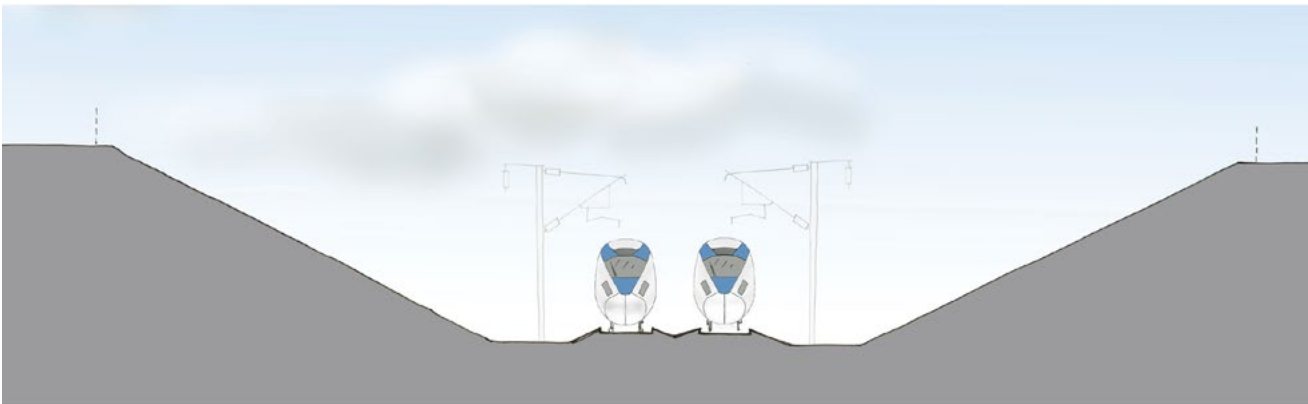
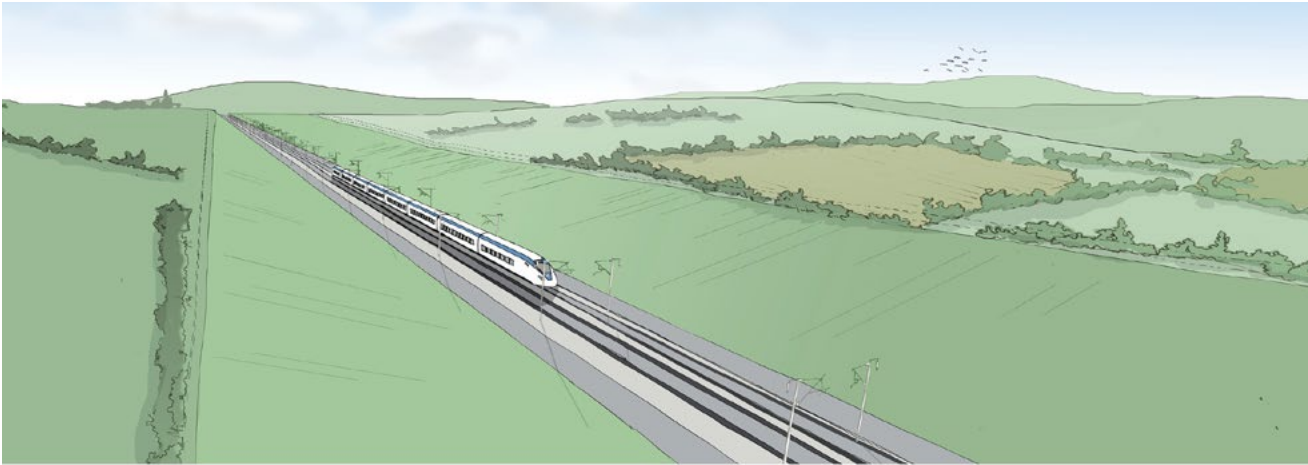


Figure 6: Cutting (generic)



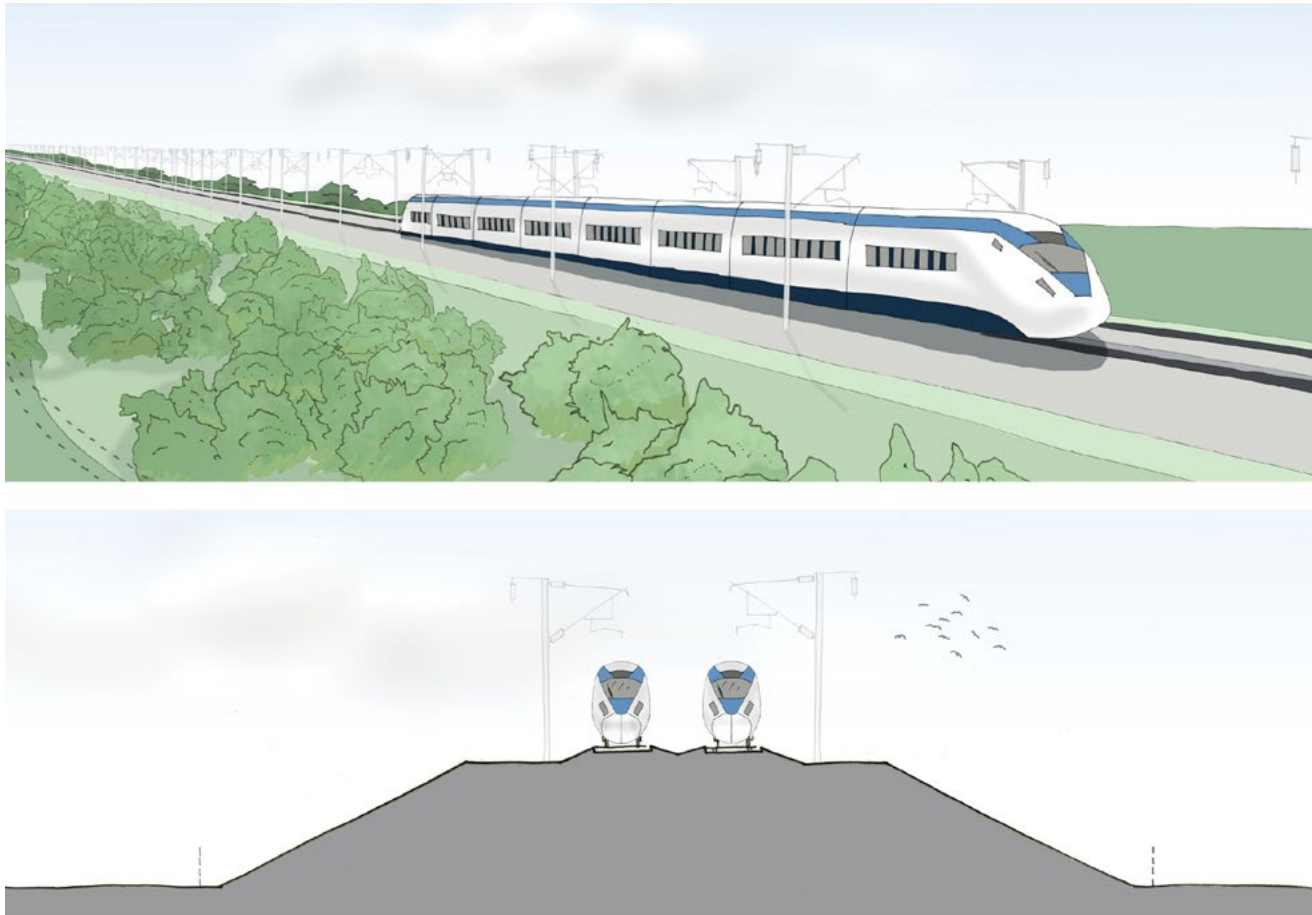
Cuttings and embankments

The route is being designed without tight curves or steep gradients so that the high speeds required can be achieved. To facilitate this, sections of the route will be in cutting or on embankment. Cuttings are sections of the route where material has been excavated to make way for the railway and maintain rail levels below the existing ground level. An example of a cutting is shown in Figure 6. In some locations, retaining walls are proposed on one or both sides of a cutting to reduce the amount of land required for the railway, as shown in Figure 7.

Figure 7: Cutting with retaining walls (generic)



Figure 8: Embankment



False cuttings will also be used along the route. False cuttings involve forming raised earth bunds on one or both sides of the route of the Proposed Scheme to help screen and integrate it into the landscape. A false cutting will be constructed at Hopton in the Colwich to Yarlet community area and in the South Cheshire area.

Embankments are where the rail level is maintained above the existing ground level using compacted soils or rock material, known as 'fill' on which the rail track is laid. An example of an embankment is shown in Figure 8.

Priority will be given to using suitable material excavated locally from cuttings and tunnels to form rail or road embankments and mitigation earthworks ('bunds') for noise and visual mitigation. Where additional high quality material is needed for rail embankment construction this will be obtained from borrow pits located adjacent to the route of the Proposed Scheme. Further information on borrow pits can be found later in Section 4 of this NTS.

Permanent maintenance facility

The Proposed Scheme includes the infrastructure maintenance base - rail (IMB-R), a permanent maintenance facility near Stone, in the Stone and Swynnerton community area, at the site of the Stone railhead main compound. The permanent maintenance facility, located on a site of approximately 4oha, will provide a central base to carry out maintenance activities on the route of the Proposed Scheme and will maintain Phase 2a infrastructure, as well as the full western section of Phase Two once operational.

Track

The ES has been prepared on the assumption of slab track as the track form for the Proposed Scheme. Slab track will comprise pre-cast concrete slabs supported on a continuous structural layer. A final decision on the track form will be made during the detailed design of the Proposed Scheme.

Train control and telecommunications

The train control and telecommunications system will be operated from a route-wide HS2 network control centre at the Washwood Heath

depot in East Birmingham, which forms part of Phase One. The purpose of the network control centre will be to supervise and control activities on the railway.

The Proposed Scheme will use radio communications as part of its operations and train control system, which will require radio antennae to be installed at fixed locations along the route.

Power supply

The Proposed Scheme will require power from the National Grid grid supply point at Rugeley, Staffordshire. This will include a 4km connection (of which 1.7km will be underground and 2.3km will be on overhead line) to the Proposed Scheme's auto-transformer feeder station at Newlands Lane in the Fradley to Colton community area. The auto-transformer feeder station will occupy an area of approximately 2.8ha and will require road access.

Smaller 'rail traction auto-transformer stations' will also be provided along the route at approximately 3 mile (5km) intervals. These will accommodate electrical switch gear,

transformers and associated equipment and will require road access. They will each occupy an area of approximately 0.1-0.2ha, and will be supplied from the Newlands Lane auto-transformer feeder station.

A 'mid-point auto-transformer station' will be located near to Gonsley Green Farm. The mid-point auto-transformer station will require an area of approximately 0.2ha, together with road access.

An express feeder auto-transformer station will be located approximately 18km to the north of Newlands Lane auto-transformer feeder station at Yarlet. This express auto-transformer feeder station will require approximately 0.4ha of land, together with road access.

Power will be transmitted to the trains through overhead line equipment. An example of overhead line equipment is shown in Figure 3.

Road, public right of way, utility and watercourse diversions

The nature and timing of any road diversions will be planned in consultation with the relevant highway authority. Roads, public rights of way and utilities that need to be diverted or realigned will normally follow the shortest practicable route, taking into account safety, pedestrian, cyclists and horse rider (equestrian) flows, motorised traffic flows, construction duration and local environmental effects.

Where new roads, bridges and public rights of way are required to cross the route, they will, where reasonably practicable, be constructed in advance and offline to allow the existing route to continue in use until its replacement is ready to be brought into public use.

Where watercourses require diversion, channel flow will be designed and maintained in consultation with the relevant regulatory authority.

Site haul routes

Where reasonably practicable, movement of construction material, construction machinery and/or construction workers between the construction compounds and worksites will be on designated temporary roads within the area of land required for construction (known as site haul routes), along the line of the route of the Proposed Scheme, or running parallel to it. Using site haul routes will reduce the need for construction vehicles to use the existing public highway network, thereby reducing traffic related impacts on the road network and local communities.

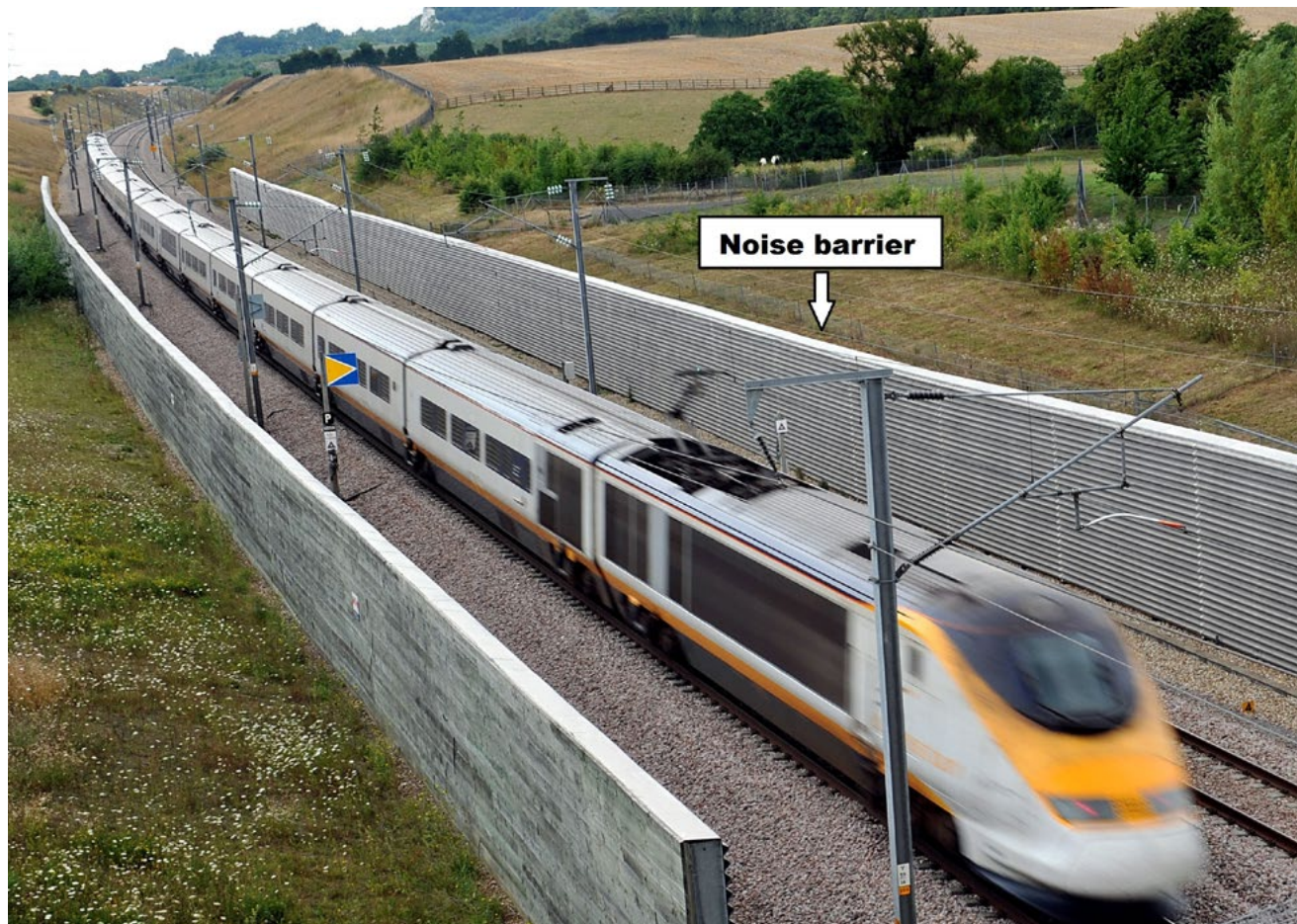
Site haul routes will be no wider than 10m wide (including land for any associated infrastructure, such as signalling). Where a site haul route crosses a public highway or public rights of way, the crossing points will be safely managed by either traffic lights or manned control points.

Site haul routes will be surfaced at the connection point between a site haul route and public highway. This will help to maintain the cleanliness of the public highway.

Noise barriers

The Proposed Scheme will incorporate noise barriers to avoid or reduce significant noise effects. These will generally take the form of landscape earthworks, such as cuttings and embankments, noise fence barriers and parapet barriers on viaducts. An example of a noise fence barrier is shown in Figure 9.

Figure 9: Example of noise fence barrier



3.3 Design development since the working draft EIA Report

This section lists the main changes made to the design of the Proposed Scheme since publication of the working draft EIA report:

- the infrastructure maintenance depot previously proposed at Crewe will now be located near Stone on the site of the construction railhead, in the form of the Stone infrastructure maintenance base - rail (IMB-R). Due to this change, the maintenance loops proposed at Pipe Ridware are no longer required;
- the Crewe South portal will be located 340m south of the location previously proposed, 960m south of the A500 Shavington Bypass;
- revisions to the lengths and heights of viaducts and embankment on various sections of the route;
- revisions to the depths of cuttings at various points along the route;
- introduction of a retaining wall at the southern porous portal of Madeley tunnel and associated modification to Madeley cutting;
- development of mitigation, including: noise barriers, landscape bunds, compensatory planting, replacement ponds, and green bridges along the route of the Proposed Scheme;
- removal of a 1.4km section of the West Coast Main Line modifications, located near Lower Den Farm;
- introduction of an additional platform (110m in length) at Crewe Station to accommodate rail services;
- revisions to roads and public rights of way works: including the realignment of some roads and provision of additional overbridges and underbridges;
- revisions to the size and locations of balancing ponds and provision of additional balancing ponds where required;
- a power connection from National Grid Rugeley substation to Newlands Lane auto-transformer feeder station to provide power to the Proposed Scheme;
- revisions to the location of some tunnel portal buildings; and
- revision to the number and locations of proposed auto-transformer and auto-transformer feeder stations.

The Proposed Scheme now includes six borrow pits, four in the Fradley to Colton community area, one in the Whitmore Heath to Madeley community area and one in the South Cheshire community area to provide sufficient material of an appropriate quality to construct railway embankments. Further details on borrow pits are included in Section 4 of this NTS.

4. Construction and operation of the Proposed Scheme

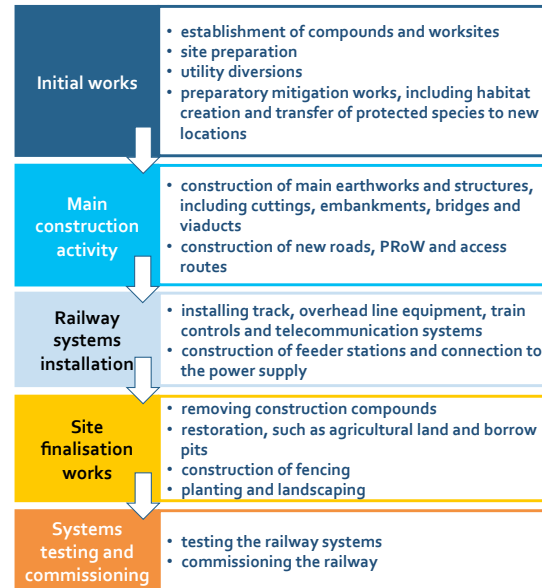
4.1 Construction programme

The Proposed Scheme is expected to be constructed between 2020 and 2027 (including a period of system testing and commissioning). The duration, intensity and scale of construction along the route will vary over this period.

Initial works include the establishment of construction compounds and construction worksites, and preliminary activities, such as utility diversions.

Preparatory mitigation works will also take place at this time. This will be followed by the main period of construction activity and civil engineering works, to construct the major components of the Proposed Scheme, including cuttings, embankments, bridges and viaducts. Once these major components have been built, activity will focus on the installation of track, overhead line equipment, train control and telecommunications systems. Finalisation works will be carried out, before a period of system testing and commissioning.

Figure 10: Stages of construction activities



4.2 Construction management

Code of Construction Practice and local environmental management plans

The construction of the Proposed Scheme will be required to comply with the Code of Construction Practice, a draft of which has been included in this ES.

Construction works will be undertaken by appropriately experienced construction

contractors. The draft Code of Construction Practice sets out the proposed measures to manage and control the effects of construction.

The draft Code of Construction Practice also includes arrangements for monitoring of environmental effects during construction, where appropriate. At a local level, site-specific control measures will be included within local environmental management plans.

The Code of Construction Practice will be finalised when the hybrid Bill is enacted. The nominated undertaker (the body or bodies appointed to implement the powers of the Bill to construct and maintain the Proposed Scheme) will be required to comply with the Code of Construction Practice throughout the construction period.

The local environmental management plans will build on the project-wide environmental requirements contained within the Code of Construction Practice. The plans will set out how the Proposed Scheme will adapt and deliver the required environmental and community protection measures within each relevant local authority area. HS2 Ltd will engage with local communities, local authorities and other

stakeholders in order to develop the local environmental management plans.

The nominated undertaker and its contractors will engage with the community, focusing on those who may be affected by construction, such as local residents, businesses and community facilities. The nominated undertaker or its contractors will notify local communities in advance of any road or public right of way realignments, diversions or closures. The nominated undertaker will appoint appropriately experienced community relations personnel.

Construction compounds

There will be two types of construction compound along the route: main construction compounds and satellite construction compounds.

Main construction compounds will act as strategic hubs for core project staff, such as engineering, planning and construction delivery staff. They will include areas for the storage of construction equipment and materials, maintenance and parking facilities, together with the main welfare facilities for staff.

Satellite compounds will generally be smaller than main construction compounds, and will 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.

Some compounds will include pre-cast yards (to manufacture concrete elements, such as bridge beams) and batching plants (to provide a supply of concrete for construction).

Some compounds will be used for major stockpiling of materials such as soil, for transfer nodes (where bulk deliveries or excavated materials leave or enter the construction worksites from public roads), or for the railhead.

A number of satellite construction compounds will continue to be used for railway systems works following the completion of civil engineering works at these locations. The railway systems compounds will facilitate installation, testing and commissioning of the railway systems, including track, overhead line equipment, communication and signalling equipment, and power supply.

The total number of compounds in each community area is set out in Sections 8.2 to 8.6, under 'The Proposed Scheme'.

Overnight accommodation for construction staff will be provided at the Yarnfield North embankment satellite compound in the Stone and Swynnerton area; the Trent South embankment main compound in the Colwich to Yarlet area; and the Basford cutting main compound in the South Cheshire area. This accommodation will help to reduce daily travel for those not normally based locally.

The siting of construction compounds has been influenced by a number of factors, including:

- size of the site required;
- proximity to locations of major construction activities;
- proximity to main roads and rail/bus routes;
- accessibility for local workforce and the presence of existing local facilities;
- existing land use and proximity to sensitive features of the environment and communities;
- avoiding floodplains; and
- ease of establishing and maintaining security.

Security fencing or hoarding will be provided around the perimeter of each construction compound.

Details for construction compounds are provided for each area in the relevant Volume 2 community area reports, Section 2.

Construction worksites

Construction compounds, both main and satellite, will act as the main points of entry to the construction worksites. Access to the construction worksites will be by road (including heavy goods vehicles and light goods vehicles), site haul route or rail to deliver construction material or machinery.

Railhead

The railhead will be situated on land between the route of the Proposed Scheme and the M6, between the areas of Stone and Yarnfield.

The railhead will connect with the existing railway network via the Norton Bridge to Stone Railway for the delivery of materials to be used for construction of the Proposed Scheme.

During installation of rail systems equipment, the railhead will operate between January 2025 and June 2026 and will be used for the import and movement of material along the route of the Proposed Scheme. Installation of the railway, to the north and south, will also be managed from this location. Prior to this, the connection to the conventional railway will be used to facilitate movement of material via the Norton Bridge to Stone Railway to reduce road transportation, where practicable.

Rail deliveries into the railhead will be undertaken both during day and night-time hours and at weekends, although unloading will generally be undertaken during core working hours.

Borrow pits

High quality construction material (sand and gravel) will be required to construct embankments for the Proposed Scheme. Much of this material will be provided from the excavation of cuttings and other works (for example, tunnels or balancing ponds) along the route of the Proposed Scheme. However, in some locations along the route, there is anticipated to be a shortfall of high quality material for use in embankment construction.

Borrow pits located in proximity to the Proposed Scheme will be used to extract material for construction. Borrow pits will be restored with other natural material, which will be excavated from cuttings, such as clay materials, which are considered unsuitable for embankments. This will then be overlain by topsoil and subsoil, including that initially stripped from the borrow pit area. The borrow pit sites will be restored to the former ground level in accordance with a design to be agreed with the local authority and the land will be made available for its previous use.

The use of borrow pits will generate lower construction traffic movements than importing the material from commercial quarries, reducing impacts. Using borrow pits will considerably reduce the number of construction vehicle movements on the highway network.

Working hours

The draft Code of Construction Practice outlines the proposed working hours for construction. Core working hours will be from 08:00-18:00 on weekdays (excluding bank holidays) and from 08:00-13:00 on Saturdays. The nominated undertaker will require its contractors to adhere to these core working hours for each site, subject to the activities during additional hours described in the following paragraphs.

Works at Crewe Station, track laying on the existing railway or works requiring possession of existing road or rail transport infrastructure may need to be undertaken during night-time, Saturday afternoons, Sundays and/or bank holidays for reasons of safety or operational necessity. These works may involve consecutive night works over weekends and may on occasion involve longer durations. Activities outside core working hours that are likely to give rise to disturbance will be kept to a reasonably practicable minimum.

Tunnelling (excluding cut-and-cover tunnels) and directly associated activities (such as removal of excavated material from tunnels, supply of materials and maintenance of tunnelling equipment) will be carried out on a 24 hours a day, seven days a week basis. Where reasonably practicable, excavated material will be stored within the site boundary for removal during core working hours.

Certain activities, such as earthworks, are season and weather dependent. Contractors may seek to extend the core working hours and/or days for such operations to take advantage of daylight hours and weather conditions, subject to the approval of the relevant local authority. Certain other specific construction activities will require extended working hours for reasons of engineering practicability. Abnormal loads, or those requiring a police escort, may be delivered outside core working hours subject to the requirements and approval of the relevant authorities.

Guidance on site-specific variations to core working hours and/or additional hours likely to be required will be included within the local environmental management plans following consultation with the relevant local authority. To maximise productivity within the core working hours, the contractors will require a period of

up to one hour before and up to one hour after core working hours for start-up and closedown of activities. Activities within these periods will include (but not be limited to) deliveries, movement to place of work, unloading, maintenance and general preparation works. Activities within these periods will not include operation of plant or machinery likely to cause a disturbance to local residents or businesses.

Site restoration

All temporary plant, materials, equipment, buildings, access roads and vehicles will be removed from site when construction is complete. This will allow the land used temporarily for construction purposes to be restored.

Where agricultural and forestry land is required only for construction purposes, it will be restored to that use where reasonably practicable.

System testing and commissioning

The railway will be fully tested to ensure it can operate safely and reliably. Commissioning will allow operational procedures to be tested and refined alongside the training of staff. The testing and commissioning is expected to take place between 2026 and 2027.

4.3 Services and operating characteristics

HS2 trains

HS2 trains will be able to run on both the high speed network and the existing network (known as 'conventional compatible' trains). Depending on demand and the time of day, services will operate as 200m long trains, carrying up to 550 passengers, or as two trains coupled together to form 400m long trains, carrying up to 1,100 passengers.

Trains will travel at speeds of up to 225mph (360kph). However, the alignment of the route has been designed to allow for train speeds of up to 250mph (400kph) in the future. Operation at up to 400kph would require demonstration that improved train design enables services to operate at that higher speed without giving rise to further significant environmental effects.

The operating speeds over each section of the Phase 2a route are anticipated to be as follows:

- up to 360kph on the route of the Proposed Scheme between the interface with Phase One and Crewe; and
- up to 230kph on the spurs that will connect the route of the Proposed Scheme to the West Coast Main Line, south of Crewe.

HS2 services

Services will operate between 05:00 and 00:00 from Monday to Saturday and between 08:00 and 00:00 on Sunday.

Maintenance and engineering works will normally take place outside these operational hours, unless the works can be safely undertaken with trains operating at the same time.

The assumed initial service pattern (in the year of opening) for Phase 2a is for up to six trains per hour in each direction. This will increase to up to 12 trains per hour in each direction once the full Phase Two network is operational.

The expected fastest typical journey times from London with Phase 2a are set out in Table 2.

Table 2: Fastest typical journey times with Phase 2a

Destination from London Euston	Fastest journey time (hours: minutes)
Crewe	0:55
Manchester Piccadilly	1:30
Preston	1:30
Liverpool	1:34
Glasgow	3:45

4.4 Maintenance and stabling of trains

Maintenance

Inspections of the route will take place on a regular basis, at night when the railway is not operating. There will be routine preventative maintenance to keep the track and other equipment (e.g. electrical and mechanical equipment) in good condition, and more periodic heavy maintenance as necessary. Permanent maintenance facilities for the Proposed Scheme will be managed and resourced from

the infrastructure maintenance facility near Stone. This maintenance facility will provide the base for infrastructure maintenance work for the full western section of the Phase Two railway to Golborne and Manchester, such as track and overhead line inspections, maintenance and renewal and replacement of mechanical and electrical equipment. Approximately 100 jobs will be created at the infrastructure maintenance facility and it will be operational 24 hours a day, 365 days a year.

Stabling and use of off-route depots.

As part of HS2 Phase One, a number of depots/stabling facilities (Edge Hill depot, Liverpool; Longsight depot, Manchester; Longsight International depot, Manchester and Polmadie depot, Glasgow) are expected to require works to accommodate HS2 conventional compatible trains. These works were assessed in Volume 4 of the Phase One ES. These depots/stabling facilities will also serve trains using the Proposed Scheme and no additional works are expected to be required.

5. Preparation of the Environmental Statement

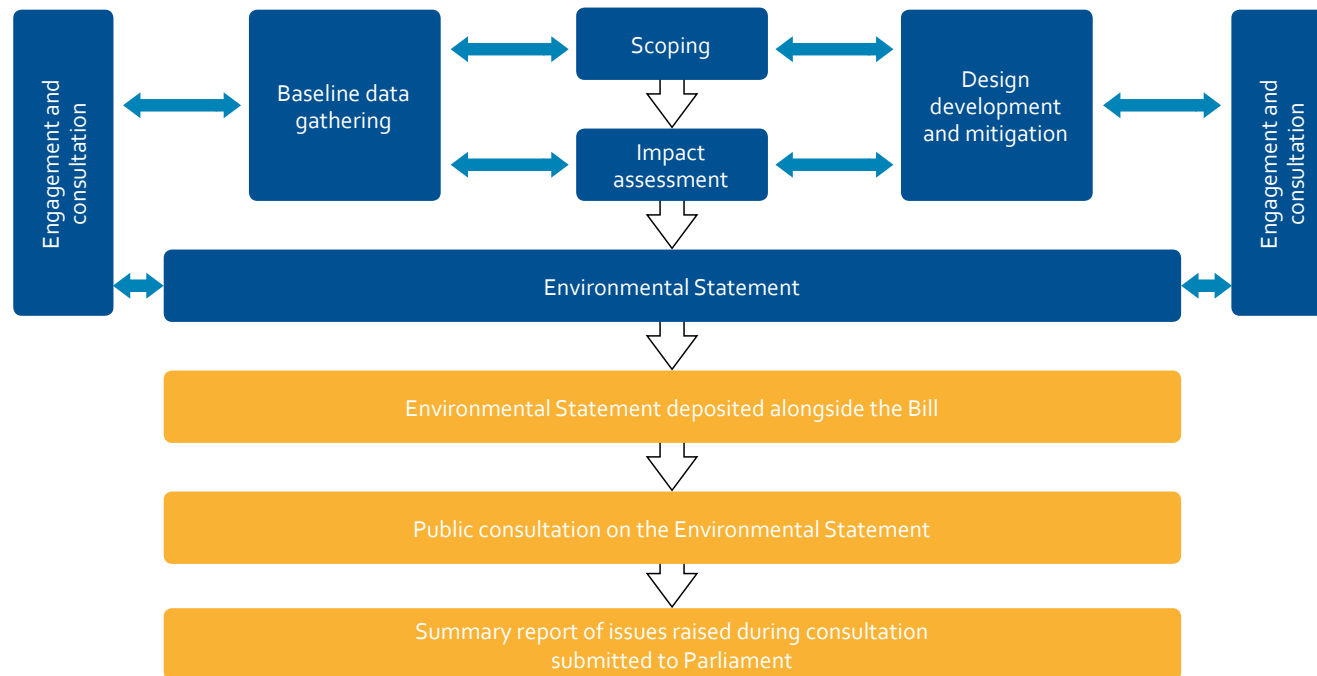
5.1 Introduction

The main steps in the preparation of the ES for the Proposed Scheme are shown in blue in Figure 11 and are outlined in this section. The ES has been prepared in accordance with UK and European legislation on environmental impact assessment, and relevant guidance.

The requirements of environmental impact assessment have been amended by a new European Union Directive since the assessment of Phase One. In May 2017, the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 transposed the requirements of the new EU Directive on EIA.

The amendments include a number of changes, for example, introducing health and major accidents and natural disasters as new topics for assessment in the EIA, and increased emphasis on the assessment of biodiversity. Additionally, there is now a specific requirement to consider the impact of the Proposed Scheme on climate change. These new and amended topics are included in the EIA for the Proposed Scheme.

Figure 11: Environmental assessment process for the Proposed Scheme



The UK voted to leave the European Union and Article 50 was invoked in March 2017. Until exit negotiations are concluded, the UK remains a full member of the European Union and all of the rights and obligations of European Union membership apply.

5.2 The Environmental Statement

The ES provides detailed information on the likely significant effects of the Proposed Scheme on the environment and the measures envisaged to avoid, prevent or reduce and monitor those effects.

The EIA process for the Proposed Scheme comprises the following related activities:

- preparation of EIA Scope and Methodology Report ('scoping') to determine the scope of the assessment, including the range of environmental topics to be addressed. The Scope and Methodology Report was published in September 2016 following consultation with the public, local authorities and a wide range of environmental organisations. Since September 2016, there have been further refinements to the scope and methodology. These are set out in the Scope and Methodology Report Addendum, which forms part of this ES;
- collection of information about current environmental conditions ('the baseline') in the vicinity of the Proposed Scheme;

- prediction of future environmental conditions without the Proposed Scheme ('the future baseline');
- environmental input to design development including consideration of reasonable alternatives;
- assessment of the likely beneficial and adverse significant environmental effects of the Proposed Scheme in accordance with the Scope and Methodology Report;
- development and assessment of proposed mitigation for identified likely significant adverse environmental effects;
- assessment of the remaining significant adverse environmental effects of the Proposed Scheme assuming the proposed mitigation is in place (referred to as 'residual effects');
- engagement and consultation with stakeholders and the public on the working draft EIA Report to help inform the design and assessment of the Proposed Scheme;
- further environmental assessment and refinement of the Proposed Scheme design, including consideration of comments received on the working draft EIA Report; and

- finalisation and submission of the ES with the hybrid Bill for the Proposed Scheme.

In accordance with House of Commons Standing Order 27A, the ES is to be deposited in Parliament. Copies of the ES will be made available for inspection.

Also, in accordance with Standing Order 224A, public participation on the ES allows for a period of at least 56 days (eight weeks) within which members of the public and other stakeholders may comment on the ES. An independent assessor will then prepare a report summarising the issues raised during that period. This report will then be submitted to Parliament.

5.3 Meeting environmental requirements

In order to ensure that the environmental effects of the Proposed Scheme do not generally exceed those assessed in the ES, the Secretary of State for Transport will establish a set of Environmental Minimum Requirements (EMR). The nominated undertaker and its contractors will be contractually bound to comply with the EMR in addition to the environmental controls imposed by the hybrid Bill and existing environmental

legislation, throughout construction and operation of the Proposed Scheme.

The EMR will also require the nominated undertaker and its contractors to use reasonable endeavours to adopt measures to further reduce the adverse environmental effects, provided that such measures are reasonably practicable and do not add unreasonable cost or delay to the construction or operation of the Proposed Scheme.

The EMR will include:

- general principles, which will establish the Secretary of State's intention to carry out the Proposed Scheme so that the impacts generally do not exceed those assessed in the ES;
- the Code of Construction Practice, which sets out the measures and standards to which a developer or contractor must adhere in order to provide effective planning, management and control of potential impacts on individuals, communities and the environment during construction;

- an Environmental Memorandum, which provides a framework for the nominated undertaker and its contractors and stakeholders, such as the Environment Agency, Natural England and Historic England, to work together to ensure that the design and construction of the Proposed Scheme is carried out with due regard for environmental considerations;
- a Planning Memorandum, which sets out an agreement between the Government and the local planning authorities relating to the processing of detailed planning approvals under the provisions of the hybrid Bill, including the design and appearance of bridges, viaducts, tunnel portals, noise barriers and earthworks;
- a Heritage Memorandum, which sets out a commitment to limit the impact on the historic environment and will address the elements of the design and construction works that will have a direct impact on heritage assets; and

- any undertakings and assurances given during the passage of the hybrid Bill through Parliament and recorded on the register of undertakings and assurances

5.4 Monitoring

The ES sets out monitoring requirements during the construction period and for environmental topics during operation of the railway, where this is appropriate.

The draft Code of Construction Practice sets out indicative inspection and monitoring procedures to assess the effectiveness of measures to prevent or reduce environmental effects during construction. Relevant local authorities and regulatory authorities, such as the Environment Agency, will be consulted on the monitoring procedures to be implemented prior to construction.

Monitoring during operation will, where appropriate, be agreed between the nominated undertaker and the relevant planning authorities or other regulatory authorities.

Further information on monitoring is set out in Section 7, Approach to environmental mitigation and monitoring, of this NTS.

6. Strategic, route-wide and local alternatives

6.1 Strategic alternatives to the Y network previously studied

The Government has concluded that action is needed to meet the future travel needs of Britain and 'doing nothing' is not an option.

Before deciding to proceed with HS2, a wide range of options to address Britain's inter-urban transport challenges were reviewed.

These included domestic aviation, new motorways, a new conventional speed rail line as well as upgrades to existing roads and railways.

The potential for capacity upgrades to the existing main rail network has been explored. The Government rejected this option as further upgrades will not provide the scale of capacity increase and connectivity benefits needed to fulfil the Government's objectives. This would also fail to meet Government objectives for future performance of the rail network and would cause considerable disruption to existing train services during construction.

Carbon emissions from air travel are significantly greater than from high speed rail. The capacity of London's airports is limited and providing for future growth in international travel will be a significant challenge without also serving additional demand from domestic air services. The Government's policy therefore is to enable and encourage more people to take the train instead of flying for domestic and short-haul journeys, to achieve environmental benefits and to release capacity at airports for longer journeys.

The Government also decided not to give further consideration to major new motorways as an alternative to HS2, as high speed rail is preferable in terms of both capacity and journey times and has lower carbon emissions and environmental effects.

The cost of a new conventional speed railway would be almost as high as those of high speed rail without delivering the reduced journey times and would have only marginal environmental benefits. For these reasons, a new conventional rail line option was rejected.

Prior to the introduction of the Phase One Bill into Parliament in November 2013, the Government considered and reported on alternative configurations for its proposed high speed rail Y network. The Government's conclusions and its reasons for promoting the Y network were reported both in the Command Paper High Speed Rail: Investing in Britain's Future' (2012) and in the ES deposited in Parliament alongside the Phase One Bill in accordance with standing orders. The Phase One Bill was enacted in February 2017.

6.2 Alternatives to the Proposed Scheme

The Government and HS2 Ltd considered four categories of alternatives for the Proposed Scheme:

- strategic alternatives: including: doing nothing (not constructing Phase 2a in advance of the rest of Phase Two) or early implementation of alternative sections of the Phase Two route;
- route-wide rail alternatives: consideration of three alternatives to the Proposed Scheme, comprising a combination of a new high speed alignment, new conventional alignment, and use of the existing conventional rail network;
- route corridor alternatives: consideration of a range of potential corridors for Phase 2a; and
- local alternatives: those which consider different design, construction and mitigation arrangements for the route at or around a community area level.

For each of the categories, alternatives have been evaluated on a comparative basis considering benefits, cost, engineering design and environmental impact.

Strategic alternatives

Doing nothing

The 'doing nothing' scenario implies not bringing forward delivery of Phase 2a (the Proposed Scheme) and instead delivering Phase One in 2026 and all of Phase Two in 2033. Delivering to this scenario would still help the Government deliver a range of benefits. However, the Government highlighted in the HS2 Phase 2a Strategic Outline Business Case, that doing nothing would mean that it would:

“miss the opportunity of realising some of these benefits six years earlier than the opening of the full Phase Two route in 2033. Doing nothing would mean that we did not accelerate delivery of this section of Phase Two, even though it is well developed, could be delivered early, and the costs of acceleration are outweighed by savings and additional revenue. Government believes that if there is a financially positive and affordable option to bring forward a tranche of benefits by six years, that would help rebalance the economy and unlock the growth and regeneration the country badly needs, then it would be perverse not to take it.”

Alternative sections of Phase Two to bring forward early

The Government considered whether there were alternative sections of Phase Two that could be brought forward to become operational in 2027. Alternative options studied were:

- between Sheffield and Leeds;
- the Western Leg all the way to Manchester; and
- between Birmingham and the East Midlands.

Following review of these alternative options, it was determined that unlike the Proposed Scheme, it would not have been possible to construct the alternative sections by 2027. This was primarily because these sections of the Phase Two route would be more difficult to construct for a number of reasons including more complex geography, or (unlike the Proposed Scheme) because they require new stations to be built.

Rail alternatives to the Proposed Scheme

In 2015, the Government commissioned a study (*Rail Alternatives to HS2 Phase 2a*) to consider the potential rail alternatives to building the Proposed Scheme. This began with a long list of options that were reduced to a shortlist of three options for further development and analysis. The alternative options comprised a combination of a new high speed alignment, new conventional alignment and use of the existing conventional rail network (the West Coast Main Line).

Alternative Option 1 – this route would use 4.4km of the Phase 2a high speed alignment up until a point near the village of Baldwin’s Gate where a short additional length of high speed alignment would link the Phase 2a route to the West Coast Main Line.

Alternative Option 2 – this route would run on the existing West Coast Main Line but would upgrade 18km of the route to operate at a conventional speed of 140mph.

Alternative Option 3 – this route would use 15km of the Phase 2a high speed alignment up until Great Haywood where an additional length of high speed alignment would link the Phase 2a

route to the existing Stone railway line and then onto the West Coast Main Line. Sections of the Stone line and West Coast Main Line (11km total) would be upgraded to operate at a conventional speed of 140mph.

Appraisal of alternatives

An appraisal was undertaken of each of the alternative options. When compared with the Proposed Scheme they did not provide the same overall capacity, level of journey time improvements or wider economic benefits.

Options 2 and 3 would also have posed high environmental risks associated with Pasturefields Salt Marsh Special Area of Conservation and Site of Special Scientific Interest. Option 1 may have a reduced environmental impact compared to the Proposed Scheme. However, taking account of the journey time savings of the Proposed Scheme, as well as issues around capacity and the ability to accommodate future growth and worsening reliability of residual passenger and freight services on the slow lines of the West Coast Main Line, it was concluded that Option 1 did not offer a suitable alternative to the Proposed Scheme. Option 1 was also unable to meet the strategic objectives of a high speed

rail line as well as the Proposed Scheme in terms of economic impact, journey time, resilience and reliability and the ability to overcome potential capacity constraints, as well as protecting capacity for growth in the future.

Therefore, the Proposed Scheme was taken forward as the preferred option.

Route corridor alternatives

An HS2 route corridor via Crewe was established as the proposed western section in 2013, and was subject to consultation between July 2013 and January 2014. Alternatives to this, including other routes via Crewe, as well as routes via Stoke-on-Trent and to the east of Stoke-on-Trent, ('the easterly corridors') were studied during earlier scheme development and were consulted upon as part of the 2013/2014 consultation.

The easterly corridors were discounted due to environmental, engineering and cost considerations, resulting in the selection of a corridor via Crewe as the preferred route to serve Manchester and provide wider connectivity to the North.

For the preferred corridor via Crewe, a route that passed to the south of Pasturefields Salt Marsh Special Area of Conservation and Site of Special Scientific Interest was selected as the preferred route. An alternative route corridor passed to the north of the salt marsh. However, investigations suggested that constructing the route to the north of Pasturefields could result in changes to brine flow, potentially directing it away from the salt marsh that could have a significant effect

on the Special Area of Conservation. The route to the south of the salt marsh would avoid this effect. The Habitats Directive and Regulations require a precautionary approach to be taken. Consideration must be given not only to whether or not a significant adverse effect would be likely to occur on a Special Area of Conservation, but also whether there is a satisfactory alternative. In this case, a route to the south presented a satisfactory alternative, and the route running to the north was not considered further. HS2 Ltd, the Environment Agency and Natural England are in agreement with this approach.

The route to the south would also avoid a number of other impacts, including property demolitions around Salt, Cotes Heath and Cranberry.

Following consultation on the proposed route via Crewe in 2013/2014, another alternative corridor via Stoke-on-Trent was studied in response to representations by Stoke-on-Trent City Council. This alternative was studied against the post-consultation refined route via Crewe. The study concluded that the route via Crewe generally performed considerably better as it would:

- require fewer property demolitions;
- affect fewer people in terms of potential annoyance from noise;
- have less impact on cultural heritage assets such as listed features and buildings;
- affect fewer areas designated for biodiversity and wildlife protection;
- affect fewer watercourses (but more groundwater resources);
- affect fewer active and disused landfills;
- cost less to construct;
- result in journey time savings; and
- improve regional connectivity.

This led to the decision to adopt the route via Crewe as the preferred route.

Local alternatives

In response to the 2013/2014 public consultation on the Phase Two route, a number of local options were examined to address potential environmental impacts of the Phase 2a route at specific sensitive locations, such as making changes to the alignment of the route or a change to the way the route runs through an area (e.g. place in a deeper cutting).

The environmental benefits were assessed alongside factors such as cost, engineering feasibility and impact on journey time. In some locations, it was concluded that, in light of these factors, the alternatives should not be pursued and the alignment used for the consultation scheme was retained. In other locations, the route was amended. The 2015 Command Paper summarised the changes made to the proposed Phase 2a route as a result of this process.

Since November 2015, as part of the design development process, a series of potentially feasible local alternatives have been reviewed by engineering, planning and environmental specialists. Alternatives were developed for individual areas of the route, which can be broadly categorised as follows:

- route alignment: for example moving the route further away from residential areas and other sensitive areas, or raising or lowering the route in places to reduce the area of land required for construction, or to mitigate landscape and visual impacts;
- how the route passes through an area: for example, having the route run on embankment instead of viaduct;
- location and/or design of Proposed Scheme features: including viaducts, embankments, tunnels, tunnel portals; and
- design and/or location of diversions for utilities, watercourses, public rights of way and roads.
- engineering requirements: the degree of design complexity and the impact this would have on construction durations, environmental impacts and construction and operational costs; and
- journey time impacts, where relevant.

Based on this assessment, a number of alternatives were taken forward and amendments were made to the November 2015 route. For example, in the Colwich to Yarlet community area, further consideration was given to the route between Staffordshire County Showground and Yarlet. The November 2015 route ran adjacent to the settlements of Marston and Yarlet and through Staffordshire County Showground. Six alternative options were identified, analysed and impacts assessed, with one of these alternative options selected to form part of the Proposed Scheme.

The selected option moves the route further away from Marston and Yarlet, resulting in a reduction in noise and community impacts as well as reducing the area of land to be lost from Staffordshire County Showground.

These alternatives were assessed against the Phase 2a route, published in November 2015, based on the following criteria:

- potential environmental impact: whether the alternative would have more or less environmental impact for each environmental topic area (e.g. sound, noise and vibration and landscape and visual);
- cost: whether the alternatives would be more cost effective or incur additional costs;

7. Approach to environmental mitigation and monitoring

7.1 Introduction

Mitigation

Environmental legislation requires the ES to include a description of the measures envisaged in order to avoid, prevent or reduce the significant adverse effects of the Proposed Scheme. Such measures are described as 'mitigation measures'.

HS2 Ltd's aim is to avoid or prevent adverse environmental effects, where reasonably practicable (for example, through changes in route alignment). Where this is not achievable, HS2 Ltd has considered mitigation measures to reduce or avoid such effects (for example, lowering the alignment to reduce visual impact). Where, despite efforts to avoid and reduce them, significant adverse environmental effects are predicted to occur, HS2 Ltd seeks to propose restoration and compensation measures.

This approach is driven by the HS2 Sustainability Policy and the HS2 Environmental Policy, with the latter stating HS2 Ltd's commitment to "developing an exemplar project, and to limiting negative impacts through design, mitigation and by challenging industry standards whilst seeking environmental enhancements and benefits".

Furthermore, the Environmental Minimum Requirements (EMR) will impose a general requirement on the nominated undertaker to use reasonable endeavours to adopt measures to reduce the adverse environmental effects reported in the ES, provided that this does not add unreasonable cost or delay to the construction and operation of the Proposed Scheme. The draft Code of Construction Practice has been produced in conjunction with the ES, so that the ES can take account of the measures that will be imposed during construction to avoid or limit the occurrence of environmental impacts and effects.

The mitigation measures depend on the nature and severity of the effect and on the effectiveness and value for money of the mitigation. Mitigation applied in the design of the Proposed Scheme includes:

- developing the route to avoid likely adverse environmental effects, including on residential properties, community facilities, public open space, businesses, farm buildings, sites of ecological and/or heritage importance and the wider landscape;
- using mitigation earthworks and planting

to screen views and integrate the Proposed Scheme into the local landscape;

- providing noise fence barriers or earthworks;
- providing links under or over the Proposed Scheme to maintain access for roads, public rights of way and properties and allow safe passage of wildlife;
- creating new habitats and other features of ecological value to compensate for unavoidable losses;
- limiting, as far as reasonably practicable, the amount of land required for the construction and operation of the Proposed Scheme;
- where suitable, using excavated materials produced within the Proposed Scheme for construction, primarily of embankments and environmental mitigation earthworks, so as to reduce the number of heavy goods vehicles on local roads;
- avoiding or reducing impacts on floodplains and floodplain storage areas; and
- providing balancing ponds to control surface water runoff.

Monitoring

The EIA Regulations require a description, where appropriate, of any proposed monitoring arrangements of significant adverse effects on the environment.

Monitoring during construction

The draft Code of Construction Practice also includes commitments to monitoring significant effects during construction. The code will specify monitoring requirements that the nominated undertaker must employ to manage the effects of construction and the monitoring of mitigation post construction.

Monitoring during operation

The nominated undertaker will carry out appropriate post-construction monitoring during the operational phase.

7.2 Environmental topic specific mitigation and monitoring

This section outlines environmental topic specific mitigation and monitoring measures.

Agriculture, forestry and soils

Mitigation

In rural areas, agriculture is the most common land use. In designing the Proposed Scheme, HS2 Ltd has worked to limit the adverse impacts on agricultural land and farm holdings as far as is reasonably practicable.

In designing the Proposed Scheme, HS2 Ltd's aim has been to avoid the highest quality agricultural land, insofar as this can be reconciled with the need to satisfy or balance a number of other important environmental and engineering considerations.

Where the Proposed Scheme will affect agricultural land, a range of measures will be put in place to help reduce impacts. Soil to be displaced will be stripped prior to construction and stored appropriately to enable agricultural land to be restored and reused after construction. The nominated undertaker will follow good practice for soil handling and land restoration, which has been successfully applied to other large infrastructure projects.

Measures will be put in place to maintain access for land management, by owners and operators of affected agricultural holdings. Owners and operators of affected agricultural holdings will be entitled to receive compensation under existing statutory compensation arrangements.

Monitoring

Construction

Appropriately qualified environmental management staff will be appointed to secure compliance with the Code of Construction Practice in relation to soils.

Their responsibilities will include the monitoring of topsoil and subsoil stripping, handling, storage and replacement, as appropriate.

On-site inspections of works will be carried out by the nominated undertaker, to monitor progress and standards of restoration.

On completion of construction, soils restored to agricultural, forestry or landscape uses will be monitored to identify any unsatisfactory growing conditions during the five-year aftercare period.

Operation

Given that no significant agriculture, forestry and soils effects are anticipated during operation of the Proposed Scheme, no operational monitoring is required.

Air quality

Mitigation

Emissions associated with activities on the construction sites (including borrow pits) will be controlled by measures within the draft Code of Construction Practice. No further air quality mitigation measures beyond those contained in the draft Code of Construction Practice are proposed. Best practice engine emission standards have been set for on and off road construction vehicles.

The railway will operate efficient, non-polluting electrically powered passenger trains.

Monitoring

Construction

Contractors will implement inspection and monitoring procedures to assess the effectiveness of measures to prevent dust and air pollutant emissions.

Monitoring of dust and particulate matter during construction of the Proposed Scheme will be undertaken following the current best practice guidance.

Monitoring of significant air quality effects adjacent to highways will be undertaken following current best practice guidance.

Operation

Given that no significant air quality effects are anticipated during operation of the Proposed Scheme, no operational monitoring is required.

Climate change

Mitigation

The HS2 Environmental Policy seeks to minimise the carbon footprint of the Proposed Scheme and deliver low-carbon long-distance journeys that are supported by low-carbon energy. The carbon footprint will be used to assess the potential to reduce greenhouse gas emissions across the design, construction and operation phases and, where reasonably practicable, a hierarchy of actions, in accordance with the HS2 Carbon Minimisation Policy, will be applied.

A carbon minimisation approach has been set for Phase One, which will set a precedent for Phase 2a to continue and build upon. Best practice guidance from the Construction Leadership Council and the Green Construction Board has also been adopted.

The HS2 Environmental Policy sets out the Proposed Scheme's principles in relation to climate change as seeking to "minimise the combined effect of the project and climate change on the environment". Measures have been incorporated into the Proposed Scheme to ensure it is resilient to climate change impacts, for example, it is being designed to accommodate rainfall and flooding levels that include an allowance for climate change.

Monitoring

Construction

Contractors will produce carbon management plans detailing 'the approach to energy and carbon dioxide monitoring and reporting from relevant site activities'. The contractor will also monitor extreme weather events during construction.

Operation

Carbon dioxide emissions will be calculated and monitored during operation. Monitoring of any significant adverse in-combination climate change effects during operation will form part

of the operational monitoring strategies for the relevant environmental topics.

Weather and climate change resilience will also be monitored.

Community

Mitigation

The assessment of community effects takes into account a range of impacts, including demolition or partial loss of residential properties, community facilities and public open space, road closures and diversions, and in-combination impacts including the effects of traffic, noise, air quality and visual impacts.

The draft Code of Construction Practice includes measures to reduce noise, air quality, visual and construction traffic effects on local communities during construction. Proposed measures include the appointment of community relations personnel, the sensitive laying out of construction sites to reduce nuisance and maintaining public roads and public rights of way around construction sites, where reasonably practicable.

HS2 Ltd has developed the design of the Proposed Scheme with the aim of minimising demolitions of residential properties and loss of community facilities so far as reasonably practicable. Overall, the Proposed Scheme will require the demolition of 26 residential properties. Where residential properties will be demolished, displaced owners and occupiers will be entitled to receive compensation under existing statutory compensation arrangements. The Government has also developed a package of property measures which includes provision for atypical properties and special circumstances.

Where private businesses which provide community facilities are displaced by the Proposed Scheme, they will be entitled to receive compensation under existing statutory compensation arrangements.

Monitoring

Any construction and operational monitoring requirements in relation to in-combination effects arising from air quality, visual, noise and construction traffic effects have been described in the relevant air quality, sound, noise and vibration, landscape and visual, and traffic and transport topic sections of this ES.

Cultural heritage

Mitigation

In designing the Proposed Scheme, HS2 Ltd's aim has been to avoid or reduce direct adverse impacts on heritage assets.

Direct adverse impacts are limited to the Grade II listed buildings at Crewe Station, the need to relocate two Grade II listed mileposts, and effects on four conservation areas:

- Trent and Mersey Canal, due to the construction of the connection of HS2 Phase One with the Proposed Scheme on the Pyford Brook South embankment in the Fradley to Colton area, and the construction of the Proposed Scheme to the north of Great Haywood in the Colwich to Yarlet area;
- Ingestre, due to construction of the Trent North embankment and the Brancote South cutting; and
- Swynnerton, due to the re-alignment of Tittensor Road.

Mitigation of the effects of the Proposed Scheme on cultural heritage will include a programme of historic environment investigation, recording, analysis reporting and archiving guided by an historic environment research and delivery strategy.

Provision has been made in the design for appropriate measures to mitigate the impact of the Proposed Scheme on the setting of heritage assets. For example, landscape planting and noise mitigation measures will be used to help preserve rural setting and character.

Monitoring

Construction

Contractors will be required to implement appropriate monitoring of the consequences of construction work, as required, on all cultural heritage assets (designated and non-designated) to ensure the effectiveness of management measures and compliance with agreed approaches to construction activities and cultural heritage assets.

Operation

There are no specific monitoring requirements during operation of the Proposed Scheme. It is assumed that all heritage assets within the land required for construction will be removed unless excluded as a result of the mitigation process.

Ecology and biodiversity

Mitigation

HS2 Ltd has designed the Proposed Scheme to avoid or reduce adverse impacts on habitats, protected species and other features of ecological value, where reasonably practicable. For example, a retained cutting has been designed at Whitmore Wood to reduce the amount of ancient woodland habitat that will be lost.

Where adverse impacts cannot be avoided, HS2 Ltd has included mitigation and compensation measures, such as translocation or relocation of protected species, provision of replacement habitat and provision of special measures, such as underpasses and green bridges, to facilitate

the movement of species across the route of the Proposed Scheme. Such measures will be used to limit the effects of loss and/or fragmentation of habitat to a level where the loss will not result in a significant adverse effect.

Monitoring

Construction

Detailed surveys will be undertaken prior to and during construction. These surveys will help refine the mitigation and control measures required during construction as appropriate, and to provide appropriate monitoring during construction.

The nominated undertaker will undertake appropriate monitoring of the consequences of construction works on ecological resources and of the effectiveness of the management measures designed to control ecological effects, associated with works that may affect protected or notable species, statutory designated or non-statutory sites of ecological interest.

HS2 Ltd is committed to monitoring the effectiveness of ecological mitigation and compensation measures for a sufficient period.

Operation

Monitoring of the effective management and performance of ecological mitigation and compensation measures will be undertaken.

Electromagnetic interference

The generation of electromagnetic fields will be managed during construction and operation of the Proposed Scheme to ensure that electrical equipment and human health are not adversely affected. Electromagnetic interference will be managed during construction in line with British and European standards and industry best practice. The main source of electromagnetic fields from operation of the Proposed Scheme will be the power supply system along the railway. The voltage and current generated by the power supply system will not be high enough to cause significant electromagnetic fields outside the railway boundary.

Health

Mitigation

HS2 Ltd has integrated mitigation of effects with the potential to influence health and wellbeing into the planning and design of the Proposed Scheme. For example, the route of the Proposed Scheme has been selected to avoid (where reasonably practicable) residential properties and other sensitive receptors, and noise mitigation and other measures have been incorporated to reduce visual intrusion and noise. Mitigation measures will also be implemented during construction and through ongoing management and delivery of the Proposed Scheme. These are incorporated into the draft Code of Construction Practice and other HS2 strategies and policies as appropriate.

Monitoring

Any construction and operational monitoring requirements in relation to impacts generated from air quality, noise and vibration, traffic and transport, and visual effects that have the

potential to influence health have been described in the relevant air quality, sound, noise and vibration, landscape and visual, and traffic and transport topic sections of this ES.

Land quality

Mitigation

The Proposed Scheme will not cross any active landfill sites (i.e. those with active licences or which are actively receiving waste). In a small number of locations, the Proposed Scheme will be constructed on land that is potentially contaminated from its previous use. The draft Code of Construction Practice contains measures to mitigate the effects of land contamination, to ensure no significant adverse effects will arise. Pre-existing contaminated soils or groundwater may be treated where they arise within the area of land required for construction. If remediation of contaminated soils or groundwater is required, there will be a beneficial effect for the environment in the long term with respect to contamination.

The Proposed Scheme will cross a number of mineral safeguarding areas for sand and gravel extraction. Where construction occurs within a mineral safeguarding area, pre-extraction will

be discussed with the mineral/land owner, the Mineral Planning Authority and other relevant stakeholders to assist in achieving effective management of minerals.

Monitoring

Construction

The nominated undertaker will require monitoring procedures to be implemented, as appropriate, in areas of contaminated land.

Groundwater and surface water monitoring plans will be prepared, in the vicinity of contamination remediation works, or where piling risk assessment has indicated a potential effect on below-ground contamination.

Monitoring of any works that have the potential to impact identified geological resources will be carried out.

Operation

During the operational phase, monitoring works (such as for groundwater and landfill gas) will continue where required.

Landscape and visual

Mitigation

A wider landscape approach to ecological compensation and mitigation has been adopted for the Proposed Scheme. Trees and grassland have been planned more extensively, reconnecting existing and fragmented habitats to create a joined up ecological network. Distributing the planting over a wider area will better help to maintain landscape character, as planting is not concentrated in large blocks of woodland which has the effect of changing the appearance of the local landscape and reducing the amount of land available for agriculture and other land uses.

The provision of new planting and landscape earthworks will help to integrate the Proposed Scheme into the local topography, landscape character and landscape pattern. This will provide visual screening for residents and other sensitive receptors (such as users of recreational sites and public rights of way). Landscape design and mitigation will create new ecological habitats and features, help reduce noise and help to reduce the effect on the setting of heritage assets.

The nominated undertaker and its contractors will maintain and monitor newly planted and landscaped areas. This will ensure that the planting successfully establishes and develops so that it achieves its mitigation objective and remains effective thereafter.

Individual elements of the Proposed Scheme, such as bridges and viaducts will be designed to be in keeping with the local landscape character. Detailed design, materials and finishes will be subject to approval by the local planning authority under the provisions of the hybrid Bill.

The draft Code of Construction Practice includes measures to limit landscape and visual impacts during construction. These include protecting existing trees, use of well-maintained fencing around construction areas and designing lighting to avoid intrusion on any adjacent residential properties.

Monitoring

Construction

The nominated undertaker will implement appropriate monitoring of any new advanced permanent or temporary planting to ensure they

become established and are properly maintained throughout the construction period.

Operation

Monitoring will be undertaken of all landscaped areas to ensure that all planting (woodlands, grasslands, wetlands and hedgerows) successfully establishes and develops, so that it achieves its wide range of functions and remains effective thereafter.

Major accidents and natural disasters

Mitigation

The Proposed Scheme, as a modern, high-speed railway, will be designed, built, operated and maintained in line with best international current practice. As such, risks related to major accidents will be managed to be as low as reasonably practicable.

The design and implementation of the Proposed Scheme has to comply with legal requirements, and applicable industry standards and codes. These require risks associated with major accidents and disasters to be identified and assessed. Infrastructure and systems must also be designed in accordance with the latest safety

standards and codes so that risks to people and the environment are eliminated or reduced to levels that are considered as low as reasonably practicable. In addition, during construction, the draft Code of Construction Practice includes the requirement for contractors and suppliers to prepare plans and protocols that address accident and disaster risk issues. This includes the preparation of community emergency plans (where relevant), traffic management plans, measures to control pollution risks, and plans to prevent fires and deal with the impacts of extreme weather events.

Monitoring

Construction

Weather events will be monitored and consideration will be given to the potential impacts of extreme weather events and related conditions.

Specific monitoring solutions, for example during tunnelling activities, will be developed as part of detailed design.

Operation

A rigorous safety management system will be established and adhered to as part of the Proposed Scheme to record adverse incidents and monitor these in order to take appropriate action where appropriate.

Socio-economics

Mitigation

Construction of the Proposed Scheme is expected to lead to displacement of businesses, with 140 jobs being displaced, including the loss of 10 agricultural jobs. Displaced businesses will be entitled to receive compensation to relocate to suitable alternative premises, under existing statutory compensation arrangements. HS2 Ltd will offer appropriate additional support to help businesses relocate to alternative premises. All reasonably practicable steps will be undertaken to limit the impact of the Proposed Scheme on existing businesses.

The measures set out in the draft Code of Construction Practice will provide further mitigation for individual significant effects (air quality noise, vibration, visual, construction traffic) on a case-by-case basis.

Monitoring

Where there are likely residual significant effects at existing businesses, the specific operational monitoring requirements in relation to noise, vibration, construction traffic, air quality and visual effects, are described in the relevant air quality, sound, noise and vibration, landscape and visual, and traffic and transport topic sections of this ES.

Sound, noise and vibration

Mitigation

HS2 Ltd has designed the Proposed Scheme with the aim of avoiding or limiting noise and vibration impacts along the route. HS2 Ltd has been able to limit the overall noise impact of the surface sections of the Proposed Scheme through careful design. The route has been aligned so as to avoid many noise-sensitive locations and to be low within the landscape where reasonably practicable.

The draft Code of Construction Practice sets out measures to control noise and vibration during construction; the primary measure being that best practicable means will be applied to minimise noise (including vibration)

at neighbouring properties. The draft Code of Construction Practice also sets out the order in which, as part of the application of best practicable means, mitigation measures should be applied.

Firstly mitigation to control noise at source will be applied, for example, the use of quiet and/or low-vibration equipment and restricted working hours. Secondly, screening will be provided, for example local screening of equipment, as well as screening along the edge of the construction worksites. Lastly, where required, the nominated undertaker will offer noise insulation and temporary rehousing, which, if accepted, will avoid significant adverse effects on internal living conditions from the construction of the railway.

In some locations it has not been possible, notwithstanding the application of mitigation measures, to avoid an increase in community noise levels. Residual effects will occur at a number of residential areas and non-residential buildings that are located closest to the construction activities.

Operational noise and vibration has been assessed using a proven methodology based upon the assessment of the HS1 project.

Operational noise will be reduced at source through the effective design and specification of the trains and track and by the provision of noise barriers.

The assessment of sound, noise and vibration considers the likely significant noise and vibration effects arising from operation of the Proposed Scheme, assuming full operation of the Y network. The assessment considers effects on occupiers of residential properties and changes in the noise environment of local communities along the route. The assessment also considers the effects of noise on community facilities such as schools, hospitals, places of worship, and also commercial properties such as offices and hotels.

Approximately 39 residential properties are predicted to be significantly affected by noise from the operation of the railway. Residential properties which are predicted to experience significant observed adverse effects from noise from the operation of the railway will be offered a noise insulation and ventilation package. If this is accepted by the owner, this will avoid significant effects on those living within the property.

Operation of the railway has been predicted as likely to result in increases in external noise

that are considered significant around a limited number of residential areas and non-residential buildings. These effects occur mainly within 300m of the route.

Taking account of modern high speed trains and track designs, the Proposed Scheme will generally not give rise to significant ground-borne noise or vibration effects on those living close to the railway.

Monitoring

Construction

The nominated undertaker will require its contractors to undertake and report such monitoring, including real-time noise and vibration monitoring, as is necessary to ensure compliance with the Code of Practice.

Operation

Noise and vibration monitoring will be carried out at different times during the lifetime of the Proposed Scheme at appropriate monitoring locations. Where noise and vibration performance deviates from expected conditions, either this information will be used to inform

possible improvements, or investigations will be undertaken to inform reasonable remedial measures.

Traffic and transport

Mitigation

The draft Code of Construction Practice includes mitigation measures to reduce and manage traffic and transport impacts during construction of the Proposed Scheme. Construction will lead to increased vehicular traffic and have the potential to cause disruption to road users. In order to manage disruption from construction traffic, HS2 Ltd will put in place measures to reduce the impact of construction vehicles using the public road network, especially local roads. Travel plans will be implemented to help mitigate the impact of worker-related transport effects during construction (such as through the promotion of public transport, car sharing and, where appropriate, works buses).

Where reasonably practicable, movement of construction material, machinery and/or construction workers between the construction compounds and work sites will be via site haul routes. These will reduce the need for construction vehicles to use the public highway

network, therefore helping to reduce traffic related impacts. Excavating borrow pits will enable high quality material for use in construction of the Proposed Scheme to be extracted locally and transported largely within the construction area of the Proposed Scheme. This will generate lower construction traffic movements than importing the material from commercial quarries, reducing impacts. Using borrow pits will considerably reduce the number of construction vehicle movements on the highway network.

It will be necessary to close, realign or divert certain local roads and public rights of way along the Proposed Scheme, both during construction and, in some cases, permanently. In all such cases, alternative routes will be available either through the use of temporary alternative routes or the existing wider network.

Where new roads, public rights of way or bridges are required to cross the route, they will, where reasonably practicable, be constructed in advance and offline so as to enable the existing route to continue in use until its replacement is ready to be brought into public use.

These bridge works will generally not require any significant diversions of road traffic but there may be some limited effects on non-motorised users (pedestrians, cyclists and equestrians) due to increased journey distances and times.

During operation, any significant effects on the existing road network are expected to be very limited and localised in extent, as there are no new HS2 stations included as part of the Proposed Scheme with new traffic generation limited to increased passenger demand at Crewe Station, trips associated with the maintenance facility near Stone and occasional traffic for maintenance of the Proposed Scheme.

Monitoring

Construction

The nominated undertaker and its contractors will undertake the necessary monitoring to ensure compliance with the requirements of the Code of Construction Practice, associated Local Traffic Management Plans and construction travel plans.

Operation

There are no HS2 stations on the route of the Proposed Scheme and operational and maintenance traffic will be very limited. The workforce travel plan will detail monitoring associated with the operation of the proposed infrastructure maintenance facility.

Waste and material resources

Mitigation

During the construction and operation of the Proposed Scheme, HS2 Ltd's objective is to limit the use of materials and generation of waste. Sustainable materials will be sourced and made efficient use of for construction of the Proposed Scheme.

The principles of the waste hierarchy will be followed, with priority given to the prevention of waste generation, followed (where this is not possible) by reuse, recycling and recovery of waste respectively, with disposal to landfill adopted only as a last resort.

Prior to implementation, HS2 Ltd will investigate further measures to limit the quantity of waste requiring landfill disposal, such as supplying surplus excavated material for use in other construction projects.

Monitoring

Construction

Monitoring of waste management activities will be undertaken by contractors in accordance with the Code of Construction Practice.

Operation

Monitoring of waste management activities will be undertaken by train operating companies and other users of the Proposed Scheme in accordance with statutory requirements.

Water resources and flood risk

Mitigation

HS2 Ltd has designed the Proposed Scheme to avoid or mitigate impacts on water resources and flood risk as far as is reasonably practicable. The measures set out in the draft Code of Construction Practice will be used to manage impacts on the water environment during

construction, including those associated with temporary works and borrow pits.

Cuttings, embankments and structures are designed to take into account the potential impact on surface waters and groundwater. Where the potential for localised impacts on groundwater levels or quality have been identified that would potentially result in significant localised effects, provision has been made for mitigation of these impacts. For example, where a potential risk to a public or private water supply abstraction has been identified, HS2 Ltd will agree a management strategy with the Environment Agency, in consultation with the affected party, to effectively manage this risk.

The Proposed Scheme will cross over watercourses either by viaduct, bridge or culvert. Minor realignments or short diversions of watercourses are proposed in some locations to minimise both the number of crossings and the length of culverts. The approach is to ensure the quality of watercourses is not significantly adversely affected. Significant adverse effects related to groundwater bodies will also be avoided. The Proposed Scheme is compliant with the requirements of the Water Framework Directive.

The aim will be to avoid increases in flooding risks from all sources, taking into account the predicted impact of climate change contained in the latest guidance provided by the Environment Agency. Where required, the Proposed Scheme will mitigate losses of floodplain by creating replacement floodplain storage areas. The aim will be to avoid adverse impacts on land drainage systems. Sustainable drainage measures have been incorporated into the design, where reasonably practicable, to control the rate, volume and quality of runoff from the footprint of the Proposed Scheme.

Monitoring

Construction

Contractors will implement appropriate surface water and groundwater inspection and monitoring procedures. This will include procedures to monitor the effectiveness of the mitigation measures associated with potentially significant effects.

Potentially adverse impacts on Water Framework Directive water bodies will also be monitored.

The Environment Agency will be consulted regarding water quality, flow and level monitoring that will be undertaken of surface and groundwater water bodies that have potential to be affected by construction of the Proposed Scheme.

The nominated undertaker will require its contractors to undertake monitoring and appropriate action will be taken if any impacts are identified.

Operation

Monitoring will be undertaken for agreed periods to confirm the effectiveness of implemented mitigation.

8. Summary of environmental effects by community area

8.1 Introduction

For each community area as shown in Figure 2, this section provides:

- a summary of the existing environment within the community area;
- a brief description of the Proposed Scheme in the community area; and
- a summary of the likely significant residual effects in the community area for the following environmental topics:
 - agriculture, forestry and soils;
 - air quality;
 - community;
 - cultural heritage;
 - ecology and biodiversity (impacts on barn owls during operation are reported in Section 9 of this NTS);
 - land quality;
 - landscape and visual;
 - socio-economics;
 - sound, noise and vibration;
 - traffic and transport; and
 - water resources and flood risk.

An assessment of health impacts has also been undertaken. A summary of impacts is reported in this section and in Section 9, where relevant.

In addition to the summaries for each community area, agriculture, forestry and soils, climate change, ecology and biodiversity, health, landscape and visual (specifically for the Cannock Chase Area of Outstanding Natural Beauty), socio-economics, traffic and transport and waste and material resources are reported on a route-wide basis in Section 9 of this NTS.

For each community area, the summary of significant environmental effects is generally confined to residual effects, i.e. those significant adverse and beneficial environmental effects of the Proposed Scheme that are likely to remain after the range of mitigation measures already incorporated into the design of the Proposed Scheme and the Code of Construction Practice are in place.

Legend for all following community area maps














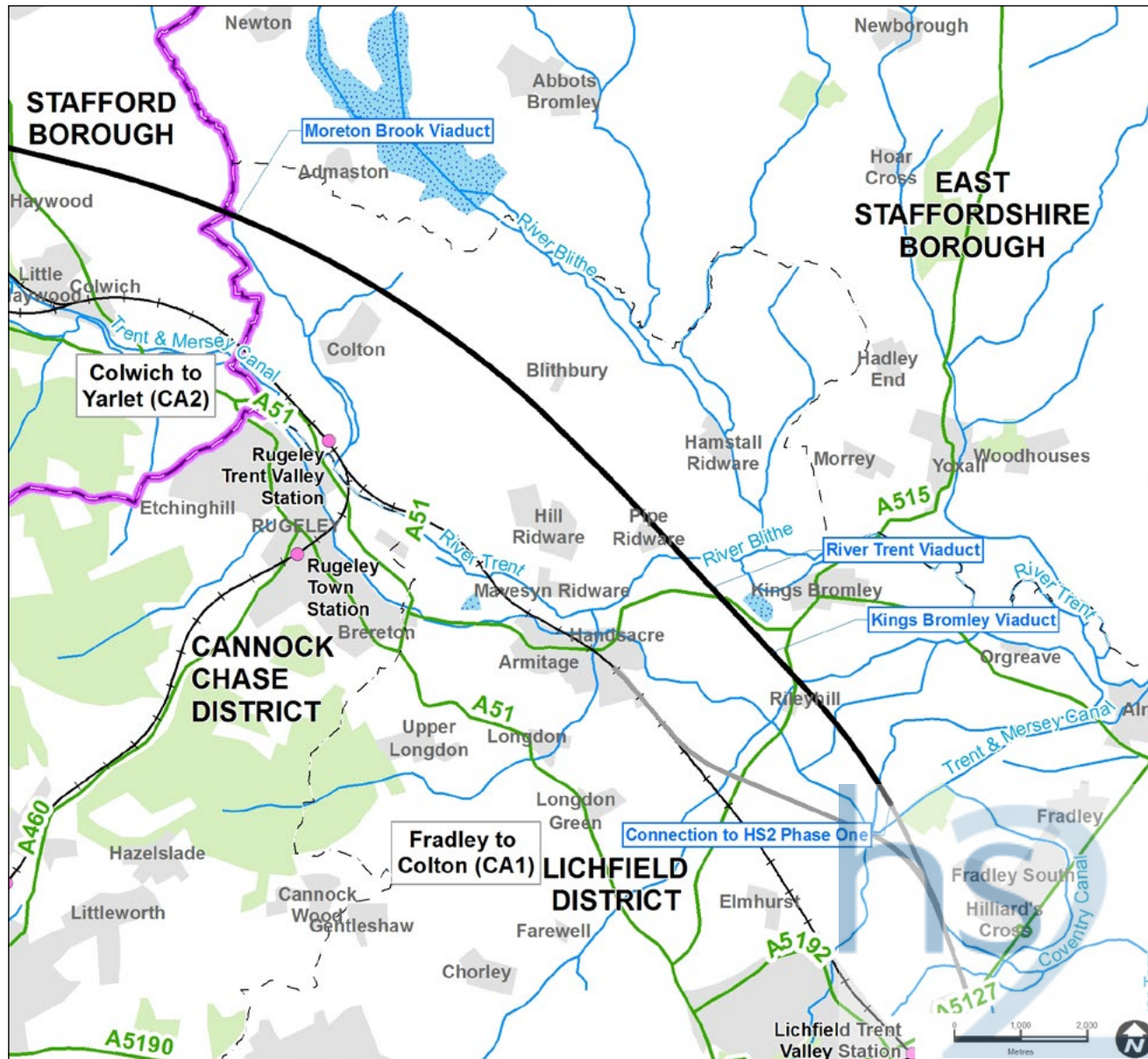
	Route in tunnel
	Route on surface
	Phase One route
	Community area boundary
	Motorway
	Major road
	Existing railway
	Railway station
	Existing railway
	Lake / reservoir
	Main river / stream
	Local Authority boundary
	Woodland, park or garden

Figure 12: HS2 Phase 2a route from Fradley to Colton



8.2 CA1 Fradley to Colton

Overview

The Fradley to Colton area is approximately 13.5km in length, extending from 250m northwest of Fradley Wood, where the route joins the HS2 Phase One route, in a north-westerly direction past Kings Bromley to Colton (see Figure 12).

The area is predominantly rural in character, with agriculture being the main land use. The southern part of this area includes extensive floodplains associated with the River Trent. Small settlements are located near the route at Fradley, Kings Bromley, Handsacre, Pipe Ridware, Hill Ridware, Blithbury, Stockwell Heath and Colton.

The Proposed Scheme

From the connection with HS2 Phase One, approximately 3km north-east of Lichfield, the route will initially run through agricultural land on embankment in a north-westerly direction. The route will cross the Pyford Brook on viaduct before returning to embankment until it crosses the Bourne Brook and the A515 Lichfield Road on the Kings Bromley viaduct. The route will transition back to embankment and then cross the A513 Rugeley Road and River Trent on viaduct, returning to embankment near the village of Pipe Ridware.

The route of the Proposed Scheme will descend into cutting south of Blithbury crossing under the B5014 Uttoxeter Road before returning to embankment to pass between the villages of Stockwell Heath and Colton. The route will move into cutting and cross over the B5013 Uttoxeter Road before transitioning to embankment and crossing the Moreton Brook on viaduct. It will return to embankment north-west of Moreton Brook, where it will continue into the Colwich to Yarlet area community area.

In this area the Proposed Scheme will require the demolition of three residential properties. Common Lane will be permanently closed where it crosses the route of the Proposed Scheme with users diverted via Crawley Lane and the A515 Lichfield Road. There will be permanent widening, realignment, diversion or extension of 19 public rights of way (including one byway open to all traffic) and 14 roads. Sixteen watercourses will be permanently realigned or diverted.

There will be realignment of an overhead power line, an underground diversion of another power line and a diversion of a high pressure gas pipeline and a fuel pipeline. The Proposed Scheme will require electricity to be provided from the National Grid and distribution network. Electricity will be provided from an existing substation at the Rugeley Power Station via a power line 4km in length, of which 1.7km will be underground and 2.3km will be on an overhead line, connecting into the Newlands Lane auto-transformer feeder station.

Nine civil engineering satellite compounds will be located within this area. Two will continue to be used as satellite compounds for railway systems works following the completion of civil engineering works at those compounds. There will also be an additional two compounds used for railway systems works only.

Four borrow pits will be located in this area, at the following locations: either side of Crawley Lane and to the south of Ashby Sitch; adjacent to the realigned A515 Lichfield Road; adjacent to the realigned Shaw Lane; and north of the River Trent viaduct.

Residual effects

Construction and operation of the Proposed Scheme in this area are not likely to result in any adverse residual effects on air quality or land quality. Similarly, no likely adverse residual effects have been identified as arising during operation for agriculture, forestry and soils and water resources and flood risk.

Interface with Phase One

The significant environmental effects of the Phase One scheme were reported in the ES deposited with the Phase One Bill and subsequent additional provisions and supplementary ES. As a result of the Proposed Scheme a number of changes to the Phase One design will be required at the interface between Phase One and the Proposed Scheme. Any new or different significant environmental effects arising from these changes are described in this section.

Agriculture, forestry and soils

Construction

Land requirements during construction of the Proposed Scheme will affect 45 agricultural holdings due to the proportion of land required, disruption, property demolitions and/or severance (i.e. where areas of agricultural holdings are cut off from the surrounding area). During construction, approximately 585ha of agricultural land will be required, approximately 368ha of which is high quality land.

Some of this land will be restored following construction, with approximately 183ha

permanently required, 132ha of which is high quality land. Eighteen holdings will be permanently affected. This includes the following holdings: Shaw Lane Farm, Land south of Blithbury Road, Stoneyford, and Land at Stockwell Heath, which are unlikely to remain as land holdings.

The Proposed Scheme will permanently require land from Woodend Farm, resulting in a moderate effect. Land will also be permanently required from this holding as a result of the construction of Phase One. When combined this will result in a major/moderate effect.

The Proposed Scheme will permanently require land from Hunts Farm, which does not result in a significant effect. However, when combined with the land permanently required from this holding as a result of the construction of Phase One, a significant effect will occur.

The land compensation code provides for compensation for the loss of agricultural land and for losses resulting from disturbance to agricultural activities.

Community

Construction

Effects associated with noise from, and views of, construction activities, and/or effects associated with heavy goods vehicle movements, in varying combinations will affect residents at: eight residential properties around Rileyhill; five residential properties along Shaw Lane and the A513 Rugeley Road; five residential properties in Pipe Ridware; a total of seven residential properties north and south of Blithbury Road; and six residential properties in Stockwell Heath.

Visitors to the duck pond at Stockwell Heath; the Four Seasons Nature Study Centre; and Trentside Meadows will also experience a combination of effects.

Construction of the Proposed Scheme will result in the demolition of two residential properties: Hadley Gate Cottage and Edlyn Cottage. The loss of these properties represents a high proportion of this small community of nine residential properties.

Stockwell Heath will experience a community-wide effect as a result of construction of the Proposed Scheme.

Operation

Noise from, and views of, the operation of the Proposed Scheme will affect residents at: 25 residential properties south of Kings Bromley; 12 residential properties in Nethertown; a total of seven residential properties north and south of Blithbury Road; eight residential properties in Pipe Ridware; 20 residential properties in Stockwell Heath and Hamley House; and 11 residential properties in Colton.

Noise from, and views of, the operation of the Proposed Scheme will affect visitors to the Four Seasons Nature Study Centre.

Cultural heritage

Construction

Construction of the Proposed Scheme will result in the removal of a number of non-designated heritage assets, including for example, the demolition of Cranberry Cottage and two farm outbuildings at Shaw Lane Farm; and the removal of a late 19th century milestone. Construction of the Proposed Scheme will also result in the partial removal of the remains associated with a probable medieval glassworks; the remains of a medieval moated site and its

fishpond; and the remains associated with the deserted settlement of Crawley.

The construction of the Proposed Scheme will affect the setting of a number of designated heritage assets: five Grade II listed farmhouses: Woodhouse, Bentley Hall, Hunger Hill, Alrewas Hayes and Lea Hall; and two Grade II listed houses: Hamley House and Lea Hall Farm Cottage. The construction of the Proposed Scheme will also permanently affect the setting of the following non-designated heritage assets: Shaw Lane Farm; Echills; and Jongham's Cottage.

Construction of the Proposed Scheme will affect the character and appearance of the local historic landscape in this area.

Construction of Phase One will result in permanent changes to the rural setting of the Trent and Mersey Canal Conservation Area and the Trent and Mersey Woodend Lock Cottage. These will experience additional changes to setting as a result of the construction of the Proposed Scheme.

Operation

Operation of the Proposed Scheme will affect the settings of the Grade II listed Woodhouse

Farmhouse, Bentley Hall Farmhouse, Hamley House and the Trent and Mersey Canal Conservation Area (the latter in combination with the presence of Phase One). Also adversely affected will be the setting of the non-designated Shaw Lane Farm. Over time, some adverse visual effects will reduce as planting matures and the Proposed Scheme integrates into the landscape, although the overall significant adverse effect will remain.

Ecology and biodiversity

Construction

One ancient and three veteran trees will be removed as a result of the construction of the Proposed Scheme. An ancient tree is a tree that is old, or aged, in comparison with other trees of the same species. Veteran trees are younger than ancient trees, but have features found on ancient trees such as decay in the trunk or branches.

New woodland will be planted, increasing the amount of broadleaved woodland in this area and improving connections between areas of woodland.

New hedgerows will be planted to replace hedgerows lost as a result of construction of the

Proposed Scheme. Following this replanting, the Proposed Scheme will result in the net loss of 12.4km of hedgerow. However, opportunities will be sought to retain or replace hedgerows within the land required for the Proposed Scheme for temporary works only. Reinstatement of existing hedgerows within the land required for temporary works will provide approximately 28.8km of hedgerow in addition to the new hedgerows planted, reducing the residual effect to a level that is not significant.

Construction of Phase One will result in the loss of approximately 3.7ha of Fradley Wood Biodiversity Alert Site. The construction of the Proposed Scheme will result in the loss of a further 0.5ha. The combined losses as a result of Phase One and the Proposed Scheme will result in a significant effect.

Health

Construction

Facilities provided by the Conservation, Horticulture, Agriculture for the Disabled Society charity at Trentside Meadows will be affected by the construction of the Proposed Scheme. Construction will require land from the site and part of the site will be cut off, with the remainder

of the site experiencing views of the activities. This will limit the use of land for outdoor activities and will also result in the loss of grazing land, which the charity uses as an income source. The charity will be compensated for this loss of income in accordance with the Compensation Code. Furthermore, activities that take place within the area of Trentside Meadows lost due to the Proposed Scheme could be accommodated within other parts of the site during the construction period.

Views of, and noise from, construction activities will be noticeable at the charity's Four Seasons site, which is used by vulnerable people, including those with mental health issues. HS2 Ltd will continue to engage with the charity to develop a mitigation strategy that will reduce or avoid impacts.

Construction of the Proposed Scheme will create a physical barrier between Colton and Stockwell Heath, with connectivity maintained by car via Newlands Lane, while connectivity for pedestrians will be temporarily unavailable during construction. This will reduce the social connections between these communities.

Operation

Views of, and noise from, the operation of the Proposed Scheme will result in permanent impacts on some areas of the Four Seasons Nature Study Centre. This is likely to lead to reduced opportunities for vulnerable people to partake in outdoor activities. Without mitigation, there may be a reduction in the physical and mental wellbeing benefits associated with therapeutic outdoor activities for people with physical and learning disabilities. HS2 Ltd will continue to engage with the Conservation, Horticulture, Agriculture for the Disabled Society charity, which operates Trentside Meadows, to develop a mitigation strategy that will reduce or avoid impacts.

Landscape and visual

Construction

The presence of construction works and changes to the existing landform and vegetation patterns as a result of the Proposed Scheme, as well as the Proposed Scheme in combination with Phase One, will affect the character and appearance of the local landscape.

Construction activities will be present in views throughout this area, including for example, from: the Trent and Mersey Canal; residential properties on Shaw Lane; the A515 Lichfield Road; Colton and Stockwell Heath; and residential properties in Hamley Heath.

Construction activities associated with both Phase One and the Proposed Scheme will be present in a number of views close to where the Proposed Scheme will connect with Phase One.

Operation

During operation, the adverse effects of the Proposed Scheme on the character and appearance of the local landscape will substantially reduce over time as mitigation planting grows and matures, however, significant adverse effects will remain.

The operation of the Proposed Scheme will affect views throughout this area, including for example, from: The Old Farmhouse and Woodgate Farm Cottage; residential properties on the A515 Lichfield Road; residential properties in Nethertown; Pipe Ridware; and residential properties in Hamley Heath.

During operation, views of both Phase One and the Proposed Scheme will be present in a number of areas close to where the Proposed Scheme will connect with Phase One.

Socio-economics

Construction

The presence of construction activities and associated construction traffic may discourage customers from staying at Common Farm Bed and Breakfast and from shopping at Bromley Hayes Garden Centre.

Operation

Noise from, and views of, the operation of the Proposed Scheme may discourage customers from staying at Common Farm Bed and Breakfast.

Sound, noise and vibration

Construction

The proposed avoidance and mitigation measures will reduce noise inside residential properties from the construction activities, such that it does not reach a level where it will significantly affect residents.

Noise from construction is likely to increase noise levels in areas outside residential properties in the following areas: Rugeley Road and Shaw Lane, to the west of Kings Bromley; Pipe Ridware; Hadley Gate, Blithbury Road; and

Stockwell Heath in the vicinity of Moor Lane and Hamley Heath. Construction traffic is likely to increase noise levels outside residential properties along Blithbury Road/Hollow Lane between Blithbury and Colton. Construction noise will also affect: Rookery Lodge Boarding Kennels/Cattery; Four Seasons Nature Study Centre; Ridware Theatre; and a planned development for seven holiday cottages at Woodhouse Farm.

HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid these significant effects.

Operation

A number of mitigation measures have been included in the design of the Proposed Scheme to mitigate noise effects during operation, including noise screening at various locations in this area.

At individual residential properties, the mitigation measures, including noise insulation, will reduce noise inside all residential properties, such that it will not reach a level where it will significantly affect residents.

Noise from the operation of the Proposed Scheme will lead to increases in noise levels

outside residential properties in the following areas: Shaw Lane, Crawley Lane and Rugeley Road, Rileyhill; Nethertown; Pipe Ridware; Hadley Gate; High Street and Narrow Lane, Colton; Moor Lane and Hamley House, Stockwell Heath; and Common Farm bed and breakfast.

Noise from the operation of the Proposed Scheme may affect: Bromley Hayes Cattery; Rookery Lodge Boarding Kennels/Cattery; Four Seasons Nature Study Centre; Ridware Theatre; and a planned development for seven holiday cottages at Woodhouse Farm.

HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid these significant adverse effects.

Traffic and transport

Construction

Construction traffic will cause additional congestion and increased delays for vehicle users at a number of junctions, including for example: the A5192 Eastern Avenue/A5127 Trent Valley Road roundabout; the B5014 Lichfield Road/A515

Tewnals Lane; the A51 Stafford Road/Borough Lane; the A51 Stafford Road/Breretonhill Lane; and the A5192 Eastern Avenue/A51 Stafford Road signals.

Increases in traffic during construction will make it more difficult for non-motorised users to cross roads throughout this area including, for example, at: the A51 Stafford Road between the A5192 Eastern Avenue and the boundary with the Colwich to Yarlet area, close to the A460 Wolseley Road; the A513 Rugeley Road/Kings Bromley Lane between Shaw Lane and the B5014 Uttoxeter Road; Pipe Lane between School Lane and Pipe Wood Lane; and Hollow Lane between Blithbury Road and Colton Bridleway 33.

Construction of the Proposed Scheme in combination with Phase One will make it more difficult for non-motorised users to cross the following two roads as a result of overlapping work trips: Blithbury Road between the B5014 Uttoxeter Road and Hollow Lane; and Pipe Lane between Blithbury Road and the Proposed Scheme.

Temporary closure or diversion/realignment of public rights of way and roads will increase travel distances for non-motorised users throughout

this area, including for example, those using: Kings Bromley Footpath 0.392(a); Mavesyn Ridware Footpath 8; Colton Footpath 34; and Shaw Lane.

Operation

Permanent realignment, diversions or extensions of public rights of way and roads will result in increased journey time for non-motorised users, and/or introduce level changes (for example in the form of bridges or underpasses) in the area, including for example, at: Kings Bromley Footpath 1; Mavesyn Ridware Footpath 8; Mavesyn Ridware Footpath 38; Colton Footpath 34; Colton Footpath 36; Common Lane; and Hadley Gate Lane.

The realignment of Stonyford Lane and Blithbury Road will result in shorter journey distances for non-motorised users on Stonyford Lane.

Common Lane will be closed on both sides where it is intersected by the Proposed Scheme, which will lead to increased journey distances due to the diversion and journey times for vehicle users as a result of the diversion.

Water resources and flood risk

Construction

Excavation of a borrow pit north-east of the River Trent viaduct may temporarily disrupt the existing groundwater abstraction at Cowley Hall Farm, which feeds a man-made pond used for fishing and agriculture. The potential impact will be investigated further and if this identifies a risk of this supply being temporarily disrupted, suitable mitigation measures will be discussed with the landowner, which may include the provision of a temporary alternative supply.

Potential springs (to be confirmed with site surveys) west of Blithbury and at Blithbury Bank will be permanently lost. If these are confirmed as springs, their loss would result in a significant adverse effect and measures would be implemented to re-establish them nearby to mitigate significant adverse effects.

Groundwater abstractions located at Woodshoot Farm (licensed for spray irrigation) and at Common Lane Farm (licensed for general farming and domestic use) may be affected by excavation of the borrow pit at Kings Bromley North, resulting in temporary adverse effects. The depths of the abstractions are not known and on a precautionary basis these effects are

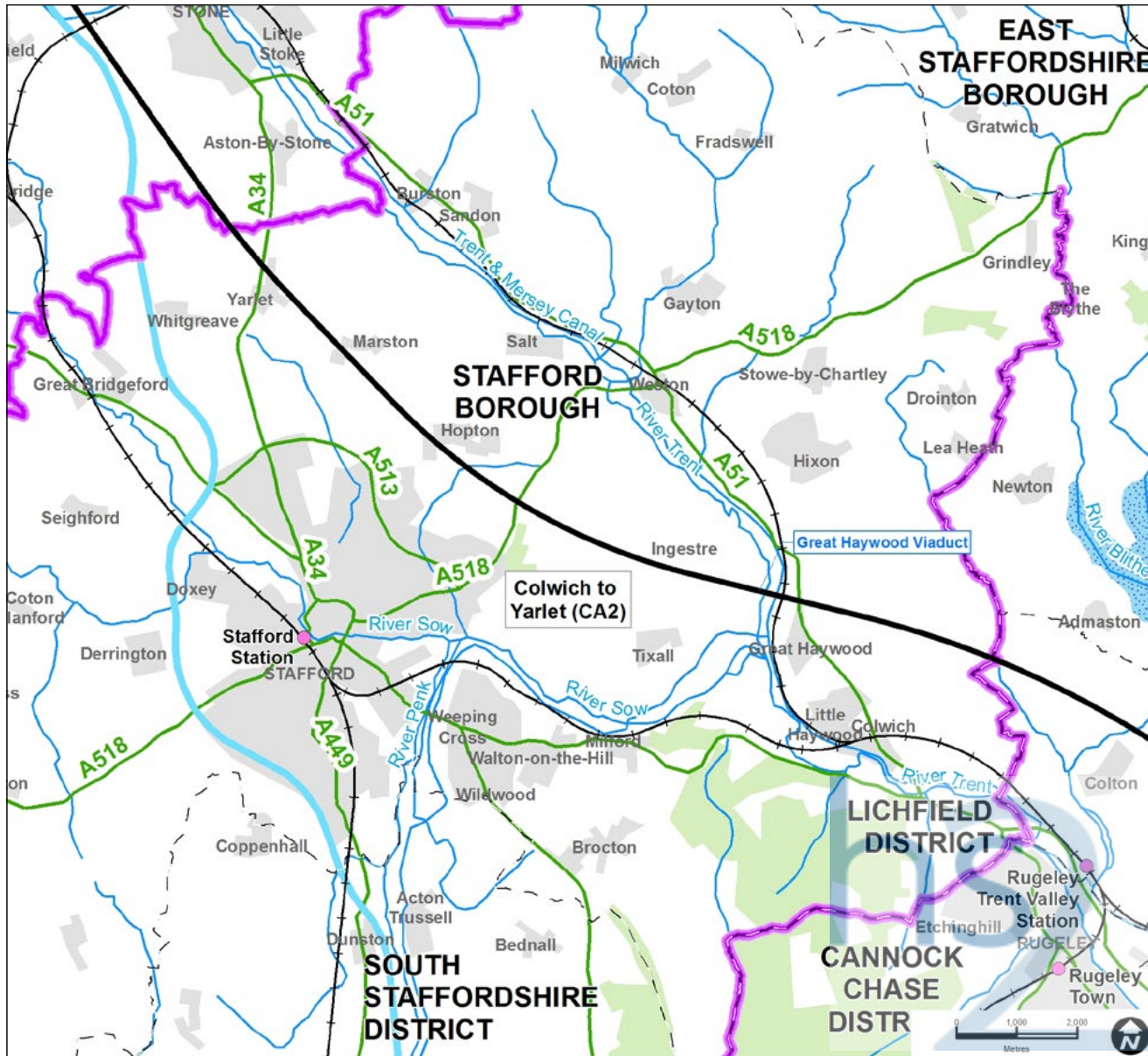
assumed to be significant. Suitable mitigation measures will be discussed with the landowner, which may include provision of a temporary alternative supply.

Construction of the Proposed Scheme may cause an increase in flood risk on the River Trent/Bourne Brook floodplain, potentially affecting Toll House and Pipe Place Farm. As the hydraulic models are further developed and the design is refined, particular attention will be paid to these flood risk issues with the aim to ensure that no parties are affected by unacceptable increases in flood risk.

Construction of the Proposed Scheme will require an existing culvert on Pyford Brook to be upgraded, installation of a new culvert on Bourne Brook and realignment of Moreton Brook. The design of the culverts and the realignment will be developed further in consultation with the Environment Agency. Monitoring will be undertaken to ensure successful establishment of the mitigation.

The existing A515 Lichfield Road will be closed and permanently realigned where it will cross the route of the Proposed Scheme, and a new section of open channel on Bourne Brook will be created, resulting in a beneficial effect.

Figure 13: HS2 Phase 2a route from Colwich to Yarlet



8.3 CA2 Colwich to Yarlet

Overview

The Colwich to Yarlet area is approximately 15.2km in length, extending from west of Moreton and on to Yarlet (see Figure 13). The area is mainly rural in character, with scattered settlements and limited community facilities. Settlements are located near the route at Little Haywood, Great Haywood, Ingestre, Tixall, Hopton, Marston and Yarlet.

The Proposed Scheme

The route will enter the area west of Mayfield Children's Home (which occupies the Grade II listed Moreton House) on embankment before moving into cutting with a retaining wall at Moreton House. The route will revert back to embankment before crossing over the A51 Lichfield Road. The route of the Proposed Scheme will then cross over the existing Macclesfield to Colwich Line (adjacent to Great Haywood Marina), the Trent and Mersey Canal and the River Trent on the Great Haywood viaduct. The route of the Proposed Scheme will return to embankment north of Ingestre Park Road until it passes through Ingestre Park Golf Club where it will enter a cutting.

The route will then run through an area in the southern part of Staffordshire County Showground (predominantly used for car parking and camping) in cutting, passing under the A518 Weston Road. The route will then pass through Hopton where it will enter a false cutting (using an embankment to help screen the railway) for approximately 300m.

The route will then continue on an embankment embankment passing Marston, before moving

into a shallow cutting past Yarlet. The route will move into a deep cutting just before passing underneath the A34 Stone Road. This will transition into a shallow cutting before continuing into the Stone and Swynnerton community area.

In this area, the Proposed Scheme will require the demolition of 15 residential properties. There will be permanent widening, realignment, diversion or extension of 24 public rights of way and nine roads. Thirteen watercourses will be permanently diverted or realigned and there will be diversions of overhead power lines, gas pipelines and fuel pipelines. The Proposed Scheme will also require land from Ingestre Park Golf Club and Staffordshire County Showground.

One main civil engineering compound and seven civil engineering satellite compounds will be located within this area, one of which will continue to be used as a satellite compound for railway systems works on completion of civil engineering works. There will also be an additional three satellite compounds which will only be used for railway systems works.

Residual effects

Operation of the Proposed Scheme in this area is not likely to result in any significant adverse residual effects on agriculture, forestry and soils, air quality, land quality, and water resources and flood risk.

Agriculture, forestry and soils

Construction

Land requirements during construction of the Proposed Scheme will result in significant adverse effects on 31 agricultural holdings due to the proportion of land required, disruption, property demolitions and/or severance. During construction, approximately 379ha of agricultural land will be required, approximately 340ha of which is high quality land.

Some of this land will be restored following construction, with approximately 198ha permanently required, 176ha of which is high quality land. Twenty agricultural holdings will be permanently affected. This includes the Green Barn, Sunnyhill Farm and Park Farm, Marston, which are unlikely to remain as land holdings.

The land compensation code provides for compensation for the loss of agricultural land and for losses resulting from disturbance to agricultural activities.

Air quality

Construction

Emissions from construction traffic will affect six residential properties, located close to the M6, to the south-west of Stafford (along Devon Way; Southfields Road; Burton Bank Lane; and Barn Bank Lane).

Community

Construction

Nine residential properties will be demolished on Hopton Lane in Hopton.

Effects associated with noise from, and views of, construction activities, and/or effects associated with heavy goods vehicle movements, in varying combinations, will affect residents at: seven residential properties in Moreton; 11 residential properties on Tolldish Lane; six residential properties at Park Farm, Stafford; 11 residential

properties in Hopton; proposed homes at Stafford North; and 11 residential properties in Marston.

Noise of, and views from, construction of the Proposed Scheme will also affect Mayfield Children's Home (which provides residential accommodation for up to 23 pupils at Rugeley School, with autism and moderate to severe learning difficulties).

The communities of Moreton, Park Farm (Stafford), Hopton, Marston and Yarlet will experience a community-wide effect as a result of the construction of the Proposed Scheme.

Approximately 2.9ha of land will be permanently required at Upper Moreton Farm, which provides educational facilities for local schools and rural therapy and farming for people including those with mental health issues, learning and emotional difficulties. This loss will not impede the ability of the farm to undertake the majority of its activities, but some users will have a more limited ability to use other parts of the farm. In addition, views of, and noise from, the construction of the Proposed Scheme will affect visitors. Upper Moreton Farm also uses Lount

Farm Local Wildlife Site (in Community Area 1: Fradley to Colton) for nature walks and ecology training. This area is required for construction of the Proposed Scheme and the farm will no longer be able to use it.

Construction of the Proposed Scheme will result in the temporary loss of approximately 9.6ha (approximately 22%) of land at the Staffordshire County Showground. Approximately 5.4ha (approximately 12%) of land at the showground, including an area of car parking and camping, will be permanently required. The loss of parking has the potential to affect the Staffordshire County Show, which takes place once a year.

Approximately 24.5ha (approximately 47%) of Ingestre Park Golf Club will either be permanently lost or severed from the club house. This will result in the loss of seven holes of the golf course. This loss will mean that the club will be unable to function in its current arrangement.

HS2 Ltd is continuing to engage with the owners and operators of Mayfield Children's Home, Upper Moreton Farm, Ingestre Park Golf Club and Staffordshire County Showground, to identify reasonably practicable measures to mitigate the residual significant adverse effects identified.

Operation

Noise and views associated with the operation of the Proposed Scheme will affect residents at: 10 residential properties in Moreton; seven residential properties at the junction of Tolldish Lane and Moreton Lane; five residential properties north of Great Haywood; six residential properties at Park Farm, Stafford; 60 residential properties in Hopton; some residential properties at a proposed development at Stafford North; and 30 residential properties in Marston and Yarlet.

Noise from, and views of, the operation of the Proposed Scheme will affect visitors to Upper Moreton Farm and St Leonards Church in Marston. Noise and views associated with the operation of the Proposed Scheme will also affect Mayfield Children's Home.

The communities of Moreton and Marston and Yarlet will experience a community-wide effect as a result of the operation of the Proposed Scheme.

Cultural heritage

Construction

Construction of the Proposed Scheme will result in the removal of a number of non-designated heritage assets, including for example: the demolition of Tithebarn Farm cottages; historic brick buildings at Mount Farm, Hopton; Upper Hanyards Farm; buried archaeological remains of potential Iron Age square barrows to the south of Lionlodge Covert; and a ha-ha (a boundary feature) in the garden at Moreton House. Construction of the Proposed Scheme will also result in the partial removal of a number of non-designated assets including for example: cropmarks, lying to the east of Little Ingestre, and surviving landscape elements of Ingestre New Park. The Proposed Scheme will pass through the designated Ingestre Conservation Area.

The construction of the Proposed Scheme will permanently affect the setting of the following designated heritage assets: the Grade II listed Moreton House; the Grade I listed Triumphal Arch, Shugborough Park; the Trent and Mersey Canal Conservation Area; and Ingestre Conservation Area. Construction will also

permanently affect the setting of the following non-designated assets: Moreton Grange; and Lowerhouse Farm, Hopton.

Construction of the Proposed Scheme will affect the character and appearance of the local historic landscape in this area.

Operation

The operation of the Proposed Scheme will affect the setting of the following designated assets: the Grade I Triumphal Arch, Shugborough Park; the Grade II listed Moreton House; the Trent and Mersey Canal Conservation Area and the Ingestre Conservation Area. The operation of the Proposed Scheme will also affect the setting of the following non-designated assets: Moreton Grange, and Lowerhouse Farm, Hopton. Over time, some visual effects will reduce as planting matures and the Proposed Scheme better integrates into the landscape. However, these adverse effects will still remain.

Ecology and biodiversity

Construction

Construction of the Proposed Scheme will result in the loss of 1.6ha of ancient woodland in this

community area (at Flushing Covert, Town Field Plantation and the Grove).

New woodland will be planted, increasing the amount of broadleaved woodland in this area and improving connections between areas of woodland.

Seven veteran trees will be removed as a result of the construction of the Proposed Scheme.

Approximately 1.5ha of inland saltmarsh habitat at Lionlodge Covert Local Wildlife Site will also be lost. However, suitable off-site compensatory measures are being sought in order to reduce this to a level that is not significant.

New hedgerows will be planted to replace hedgerows lost as a result of construction of the Proposed Scheme. Following this replanting, the Proposed Scheme will result in the net loss of 2.1km of hedgerow. However, opportunities will be sought to retain or replace hedgerows within the land required for the Proposed Scheme for temporary works only. Reinstatement of existing hedgerows within the land required for temporary works will provide approximately 12.8km of hedgerow in addition to the new hedgerows planted, reducing the residual effect to a level that is not significant.

There will be a net loss of 3.1ha of lowland meadow habitat at Lount Farm Local Wildlife Site. However, in consultation with Staffordshire Wildlife Trust and local landowners, suitable off-site compensatory measures are being sought in order to reduce this to a level that is not significant.

Health

Construction

Without mitigation, noise associated with, and views of, construction activities in proximity to Mayfield Children's Home is likely to affect the health and wellbeing of pupils. HS2 Ltd will continue to engage with the owners of the children's home to develop mitigation measures to avoid or reduce the impacts on the facility.

Construction of the Proposed Scheme may result in a reduction in the range and quality of services provided at Upper Moreton Farm, due to the direct loss of land and noise and visual impacts on the farm environment. HS2 Ltd will continue

to engage with the owners of Upper Moreton Farm to develop mitigation measures to avoid or reduce the impacts on vulnerable users of the facility.

If construction of the Proposed Scheme leads to the loss of Ingestre Golf Club clubhouse as a facility available for use for local community meetings, clubs and societies, this may reduce social networks. If no suitable alternative facility is made available, there may be an effect on wellbeing in the local community.

Operation

Loss of land, noise and visual impacts at Mayfield Children's Home and Upper Moreton Farm may affect the health and wellbeing of users.

HS2 Ltd will continue to engage with the owners and occupiers to develop mitigation measures that will reduce or avoid impacts on vulnerable users.

Land quality

Construction

Landfill material at Staffordshire County Showground will be removed to excavate

the Hopton South cutting. This will improve groundwater quality and reduce risks to human health and properties.

The dismantled railway in Hopton is within the area required for construction of the Proposed Scheme. As part of the construction phase, remediation will be undertaken on this land as necessary, which could reduce the risks to surface water quality and improve groundwater quality.

At Upper Hanyards Farm there have been historical risks to groundwater due to the presence of a tank on the farm. The water supply to this farm and Lower Hanyards Farm comes from a borehole. The Proposed Scheme will result in the demolition of Upper Hanyards Farm and its borehole. In the future, water supply to Lower Hanyards Farm will likely need to come from a mains supply resulting in a beneficial effect on drinking water quality.

Landscape and visual

Construction

The presence of construction works and changes to the existing landform and vegetation patterns will affect the character and appearance of the local landscape.

Construction activities will be present in views throughout this area, including for example, from: a public right of way at Gorse House, Tolldish Lane and Coley Lane; Great Haywood; the Trent and Mersey Canal; Tixall Park; Stone Circles Challenge long-distance path; and residential properties at Marston and Yarlet.

Operation

The presence of the Proposed Scheme will affect views throughout this area, including for example, from: residential properties and

a public right of way at Moreton Farm; Great Haywood; residential properties and public rights of way at Hopton; Stone Circles Challenge long-distance path; residences at Marston and Yarlet and Marston Footpath 2.

During operation, the effects of the Proposed Scheme on the character and appearance of the local landscape will substantially reduce over time as mitigation planting grows and matures, however the effects will remain.

Socio-economics

Construction

The operation of Staffordshire County Showground will be impaired during some major events due to loss of car parking, potentially lessening its attractiveness for users/exhibitors.



View from the Trent and Mersey Canal towpath looking towards the proposed Great Haywood viaduct (year 15 of operation)

Views of, and noise from, construction of the Proposed Scheme will result in significant effects on residents of Mayfield Children's Home, which may impair its operation.

Construction works may discourage visitors from using the Great Haywood Marina, which may impair its operation.

HS2 Ltd is continuing to engage with the operators of these facilities to identify reasonably practicable measures to mitigate the residual significant adverse effects.

Operation

Views of, and noise from, the operation of the Proposed Scheme will affect the residents of Mayfield Children's Home, which may impair its operation. HS2 Ltd is continuing to engage with the home to identify reasonably practicable measures to mitigate these effects.

Sound, noise and vibration

Construction

The proposed avoidance and mitigation measures will reduce noise inside residential properties from the construction activities

such that it does not reach a level where it will significantly affect residents.

Noise from construction is likely to increase noise levels outside residential properties in the following areas: Moreton; Tolldish Lane, Great Haywood; Park Farm, Trent Walk, Stafford; Hopton, to the east and west of the Proposed Scheme; and Marston Lane, Marston.

Construction noise will also affect the non-residential buildings at: Upper Moreton Farm; Mayfield Children's Home, Moreton House; and Park Farm Farmhouse (Stafford).

HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid these significant adverse effects.

Operation

A number of mitigation measures have been included in the design of the Proposed Scheme to mitigate noise effects during operation, including noise screening at various locations in this area.

At individual residential properties, the mitigation measures, including noise insulation, will reduce noise inside all residential properties

such that it will not reach a level where it will significantly affect residents.

Noise from the operation of the Proposed Scheme is likely to result in changes to noise levels outside residential properties in the following areas: Moreton/Bishton Lane, Moreton; Tolldish Farm on Tolldish Lane; Ingestre Park Road and Hoo Mill Lane, Great Haywood/Ingestre; Tixall Farm and Tixall Court, Tixall; Park Farm, Trent Walk, Stafford; Battle Ridge, Kings Drive, Lower Lane, Wilmore Hill Lane, Hopton Hall Lane and Hopton Lane, Hopton; Mount Edge, Spode Avenue and Ridgeway Close, Hopton; Marston Lane and Yarlet Lane, Marston.

Noise from the operation of the Proposed Scheme will affect non-residential buildings at: Upper Moreton Farm; Mayfield Children's Home, Moreton House; and St Leonards Church. Construction of the Proposed Scheme will result in noise and vibration effects on Park Farm Farmhouse.

HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid these effects.

Traffic and transport

Construction

Construction of the Proposed Scheme will require the temporary loss of up to approximately 20 informal parking spaces around the Great Haywood Marina.

Construction traffic will cause additional congestion and increased delays for vehicle users at a number of junctions, including for example: the A513 Beaconside/B5066 Sandon Road priority junction; the A518 Weston Road/Blackheath Lane roundabout; the A518 Stafford Road/A51 London Road signals; Blackheath Lane/Baswich Lane/Tixall Road signals; and the A51 Lichfield Road/Hoo Mill Lane/Church Lane.

Increases in traffic during construction will make it more difficult for non-motorised users to cross roads throughout this area, including for example, at: the A518 Weston Road between the Proposed Scheme and the A51 London Road; the A34 Stone Road between the A513 Beaconside and Whitgreave Lane; Great Haywood Road/Tixall Road between Blackheath Lane and the

Proposed Scheme; Marston Lane between the Proposed Scheme and the A513 Beaconside; and Hanyards Lane between the Proposed Scheme and Tixall Road.

Temporary closure or diversion/realignment of public rights of way and roads will increase travel distances for non-motorised users throughout this area, including for example, those using: Colwich Footpath 26; Tixall Bridleway 0.1630(b); Marston Bridleway 8; Mount Edge; and Hopton Lane (the latter both for equestrians).

Operation

The diversion of Tolldish Lane and Hopton Lane will result in a reduction in traffic on the retained sections of these roads, making it easier for non-motorised users to cross the road.

The Proposed Scheme will result in a loss of approximately 800 parking spaces at the Staffordshire County Showground. There will also be a loss of an area used as a camping ground and for permit parking. The majority of events should not be affected by this, with the impact limited to larger events.

Permanent realignment, diversions or extensions of public rights of way and roads will result in increased journey time for non-motorised users, and/or introduce level changes (for example in the form of bridges or underpasses) in the area, including for example, at: Colwich Footpath 36; Colwich Footpath 26; Hopton and Colton Footpath 6; and Hopton Lane (for equestrians).

Colwich Bridleway 58 ends at its junction with Colwich Footpath 54, with no onward route for equestrian users. As part of the Proposed Scheme, users will benefit from the upgrade of a section of Colwich Footpath 55 to a bridleway and an onward extension to Tolldish Lane, resulting in a beneficial effect. Colwich Bridleway 23 will be realigned on a shorter route, resulting in a beneficial effect for users.

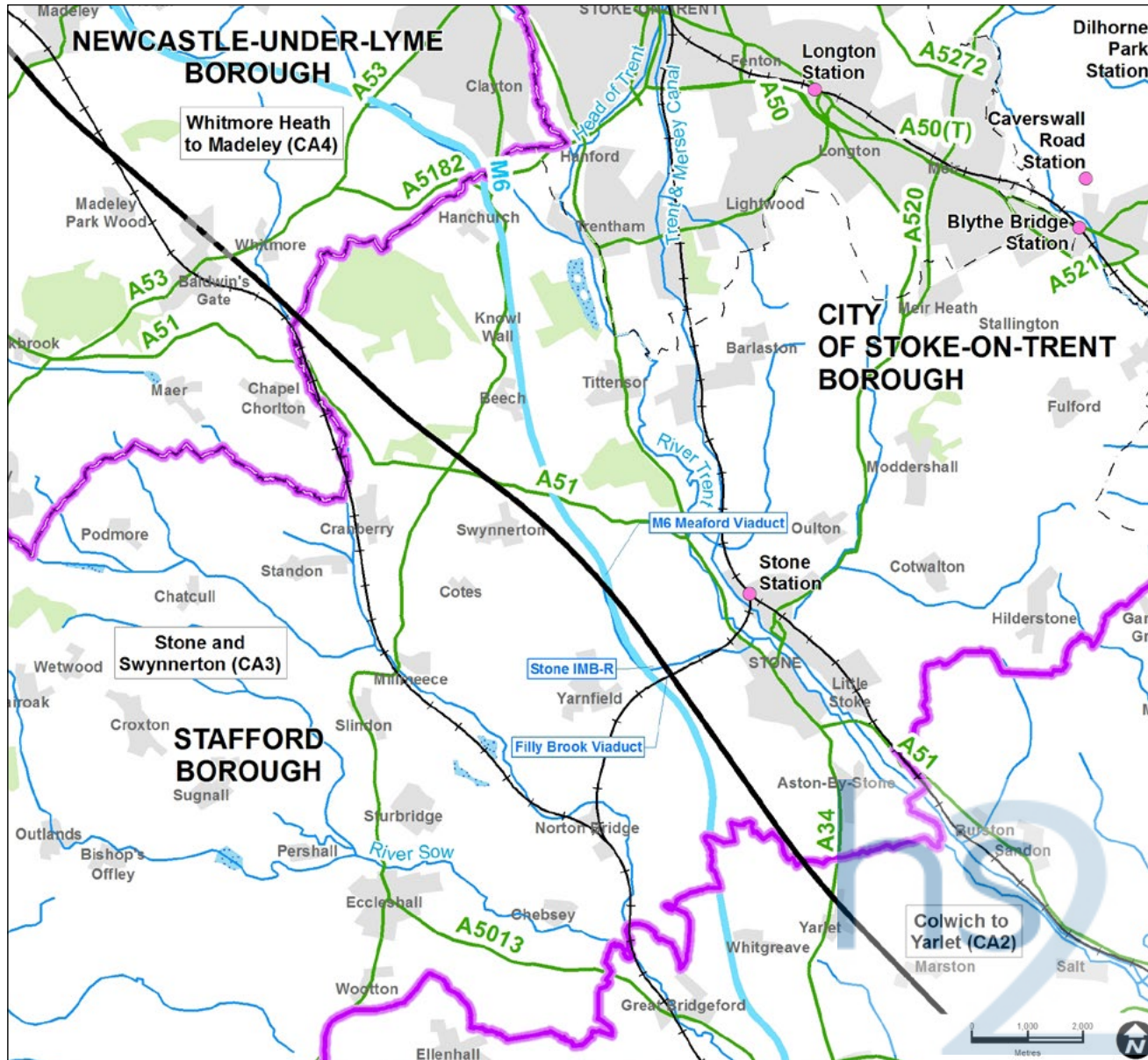
Water resources and flood risk

Construction

There will be permanent loss of some saline springs believed to be feeding an area of inland saltmarsh meadow at the south-west end of Lionlodge Covert. It is proposed to create a similar groundwater dependent saltmarsh habitat nearby. Hydrogeological surveys of this feature will be undertaken, once access has been obtained, to inform the design of this mitigation. Until the mitigation strategy, and the proposals for these saline springs, has been developed in detail, this is considered a significant adverse effect.

The Proposed Scheme may result in a permanent decrease in the groundwater catchment to a potential spring (to be confirmed with site surveys) at Lower Bridge Farm. If this is confirmed to be a spring, this would result in a significant adverse effect. Measures would be implemented to mitigate this effect.

Figure 14: HS2 Phase 2a route from Stone and Swynnerton



8.4 CA3 Stone and Swynnerton

Overview

The route of the Proposed Scheme in the Stone and Swynnerton area is approximately 13.5km in length, extending from south-west of Aston-by-Stone in a north-west direction, ending adjacent to Swynnerton Old Park (Figure 14). The area is predominantly rural in character with agricultural land interspersed with villages, isolated residential properties and farms. Settlements are located near the route at Stone, Yarnfield, Cold Norton, Swynnerton, Aston-by-Stone and Stableford.

The Proposed Scheme

The route will enter the area and run in cutting, continue onto embankment and then re-enter cutting north of the M6 Stafford Motorway Services (southbound). The route will remain in cutting adjacent to the M6, running under the B5026 Eccleshall Road. The route will then cross the Norton Bridge to Stone Railway and Filly Brook on viaduct before transitioning back to embankment under the realigned Yarnfield Lane.

The route of the Proposed Scheme will run alongside the proposed Stone infrastructure maintenance base - rail (IMB-R) on embankment. It will cross the M6 on viaduct, following which the route will remain on embankment until north-east of Swynnerton, where it will move to a series of cuttings and embankments.

The route will run under the realigned Tittensor Road and the A519 Newcastle Road, before passing through Clifford's Wood. On embankment, the route will pass the Common Lane War Bunkers and over Common Lane before entering cutting. This section will end on embankment at Shelton under Harley at the boundary with the Whitmore Heath to Madeley community area.

The Stone infrastructure maintenance base - rail (IMB-R) will occupy the site of the Stone railhead that will be used during construction. It will be located on land between the route of the Proposed Scheme and the M6, north of the Norton Bridge to Stone Railway. The facility will operate as a base for maintenance activities to support the railway infrastructure for the Proposed Scheme and the remaining section of Phase Two to Golborne and Manchester. Rail tracks will connect the HS2 main line to the Stone infrastructure maintenance base - rail and the Norton Bridge to Stone Railway.

In this area, the Proposed Scheme will require the demolition of five residential properties. There will be permanent closure of Stab Lane, Tittensor Road and Bottom Lane. Connections for users of Stab Lane and Tittensor Road will be provided via the diverted Tittensor Road. Users of Bottom Lane will be diverted via the A519 Newcastle Road and A51 Stone Road. There will be permanent widening, realignment, diversion or extension of 11 public rights of way and 10 roads. Thirteen watercourses will be permanently diverted or realigned and high pressure gas mains and overhead power lines will be diverted.

One main civil engineering construction compound and eight civil engineering satellite compounds will be located in this area. Two of these civil engineering compounds will continue to be used as satellite compounds for railway systems works following the completion of civil engineering works. There will be three further railway systems compounds in this area, one of which is the Stone railhead main compound, which will support the railway systems works throughout much of the Proposed Scheme.

Residual effects

Construction and operation of the Proposed Scheme in this area are not likely to result in any adverse residual effects on: air quality, land quality, socio-economics, and water resources and flood risk. Similarly, no likely adverse residual effects have been identified as arising during operation for agriculture, forestry and soils, and sound, noise and vibration.

Agriculture, forestry and soils

Construction

Land requirements during construction of the Proposed Scheme will affect 22 agricultural holdings due to the proportion of land required, property demolitions, disruption and and/or severance. During construction, approximately 422ha of agricultural land will be required, approximately 376ha of which is high quality land.

Some of this land will be restored following construction of the Proposed Scheme, with approximately 271ha permanently required, 247ha of which is high quality land. Eighteen agricultural holdings will be permanently affected. This includes Little Micklow Farm, Pool House Farm, and Land south of Yarnfield Lane overbridge, and Land south of Yarnfield Lane, which are unlikely to remain as land holdings.

The land compensation code provides for compensation for the loss of agricultural land and for losses resulting from disturbance to agricultural activities.

Community

Construction

The construction of the Proposed Scheme will result in the loss of two residential properties, Whisper Barn and Jacobyre, in Shelton under Harley. The loss of these properties represents a high proportion of this small community of five residential properties. The three remaining residential properties will experience views of construction compounds and works and their access road (Bent Lane) will experience significant increases in traffic due to construction vehicles. Noise from, and views of construction activities, will affect residents in eight residential properties on Pirehill Lane.

Operation

Noise from, and views of, the operation of the Proposed Scheme will affect residents within the three remaining properties in Shelton under Harley.

Cultural heritage

Construction

Construction of the Proposed Scheme will result in the removal of the following non-

designated heritage assets: Darlaston Pool, the milestone near Cash's Pit, and sections of former field boundaries to the south and west of Shelton under Harley Farm. One bunker will be demolished at the Cold War bunker complex at Hatton, with the remaining bunkers cut off from each other. Construction works will be required within the designated Swynnerton Conservation Area.

The construction of the Proposed Scheme will permanently affect the setting of the following designated heritage assets: the Grade II listed Blakelow Farm; the Grade II listed former Water Tower on Stab Lane; and the Grade II listed Swynnerton Heath Farmhouse.

Construction of the Proposed Scheme will also permanently affect the character and appearance of the local historic landscape in this area.

Operation

The operation of the Proposed Scheme will affect the settings of the Grade II listed Blakelow Farm and the Grade II listed Water Tower. Over time, some visual effects will reduce as planting matures and the Proposed Scheme integrates into the landscape, but the identified adverse effects will remain significant.

Ecology and biodiversity

Construction

Construction of the Proposed Scheme will result in the loss of 1.9ha of ancient woodland at Clifford's Wood Local Wildlife Site and Birchwood.

New woodland will be planted, increasing the amount of broadleaved woodland in this area, which will help improve connections between areas of woodland.

Four veteran trees will be removed as a result of the construction of the Proposed Scheme.

The construction of the Proposed Scheme will require Filly Brook and a connected minor watercourse to be realigned. Part of the realigned brook and minor watercourse will be temporarily culverted, resulting in a temporary significant adverse effect.

New hedgerows will be planted to replace hedgerows lost as a result of construction of the Proposed Scheme. Following this replanting, the Proposed Scheme will result in the net loss of 11.6km of hedgerow. However, opportunities will be sought to retain or replace hedgerows within the land required for the Proposed Scheme

for temporary works only. Reinstatement of existing hedgerows within the land required for temporary works will provide approximately 19.6km of hedgerow in addition to the new hedgerows planted, reducing the residual effect to a level that is not significant.

Health

Construction

Construction of the Proposed Scheme will require the demolition of two of the five residential properties in Shelton under Harley, resulting in the loss of social connections within the community.

Operation

The Stone IMB-R and associated lighting will be visible from residential dwellings along Yarnfield Lane and at the north-eastern edge of Yarnfield. Noise from passing trains will be noticeable. Residents of these properties are likely to experience these features as changing the quality of their neighbourhoods. It is considered that the effects will lessen over time, as mitigation planting becomes established and as communities become accustomed to the presence of the Proposed Scheme.

Landscape and visual

Construction

The presence of construction works and changes to the existing landform and vegetation patterns will affect the character and appearance of the local landscape.

Construction activities will be present in views throughout this area, including for example, from: Stone Rural Footpath 29; residential properties to the west of Walton; from Darlaston Grange, Yarnfield Lane; residential properties at Chase Lane; and Dog Lane, Chapel and Hill Chorlton Footpath 12, and Bent Lane adjacent to Stableford.

Operation

During operation, the effect of the Proposed Scheme on the character and appearance of the local landscape will substantially reduce over time as mitigation planting grows and matures, however, effects will remain.

The operation of the Proposed Scheme will affect views throughout this area, including for example, from: the B5026 Eccleshall Road and from Chebsey Footpath 7 near Cold Norton; Swynnerton Footpath 38; Grange Cottage on Hall

Lane; and residential properties at Blakelow on Swynnerton Footpath 27.

Sound, noise and vibration

Construction

The proposed avoidance and mitigation measures will reduce noise inside residential properties from the construction activities, such that it does not reach a level where it will significantly affect residents.

Noise from construction traffic is likely to increase noise levels outside residential properties adjacent to the road along Pirehill Lane/Green Lane between Walton and Whitgreave.

HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid this significant effect.

Traffic and transport

Construction

Construction traffic will cause additional congestion and increased delays for vehicle users at the following junctions: the A34 Stafford Road/A51 Stone Bypass/Brooms Road roundabout; the A34 Stafford Road/The Fillybrooks/B5026 Eccleshall Road roundabout; the A500 Queensway/A519 Newcastle Road roundabout; the B5026 Eccleshall Road/Pirehill Lane; the A519 Newcastle Road/A5182 Trentham Road signals; and the A500 Queensway/A34 Stone Road.

Increases in traffic during construction will make it more difficult for non-motorised users to cross roads throughout this area, including for example, at: the A51 The Rowe between Common Lane and Dog Lane; the A519 Newcastle Road between the A51 Stone Road and the A500 Queensway; Yarnfield Lane between the Proposed Scheme and the A34. The Fillybrooks; Pirehill Lane between the Proposed Scheme and the B5026 Eccleshall Road; and Bottom Lane between the A51 Stone Road and the A519 Newcastle Road.



View from Darlaston Grange, Yarnfield Lane, looking towards the Filly Brook viaduct and Stone Infrastructure maintenance base - rail (construction phase)

Temporary closure or diversion/realignment of public rights of way and roads will increase travel distances for non-motorised users on the following: Stone Rural Footpath 28; Stone Rural Footpath 33; Swynnerton Footpath 15; Swynnerton Footpath 17; and Swynnerton Bridleway 54.

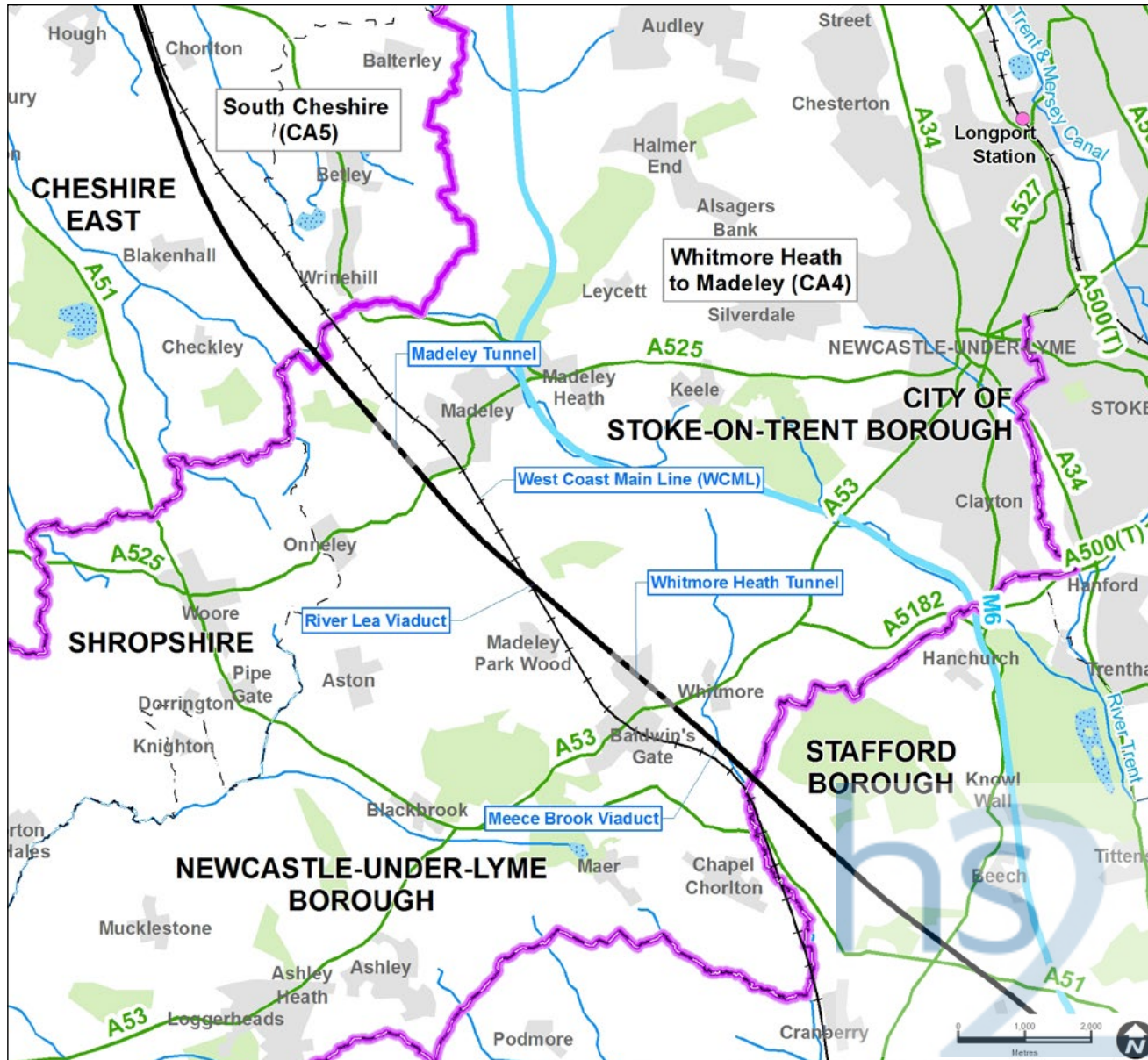
Operation

The closure of Stab Lane will increase traffic on the diverted Tittensor Road. The diversion of the A51 Stone Road will increase traffic flows on the A519 Newcastle Road. The diversion of Bent Lane to form Bent Lane (north) will increase traffic flow on Dog Lane. These increases in traffic will

make it more difficult for non-motorised users to cross these roads. The closure of Stab Lane and Tittensor Road will result in reductions in traffic on the retained sections of these roads, which will make it easier for non-motorised users to cross.

Permanent realignment, diversions or extensions of public rights of way and roads will result in increased journey time for non-motorised users, and/or introduce level changes (for example in the form of bridges or underpasses) in the area, including for example, at: Stone Rural Footpath 32; Swynnerton Footpath 17; Yarnfield Lane; Stab Lane; and the A519 Newcastle Road.

Figure 15: HS2 Phase 2a route from Whitmore Heath to Madeley



8.5 CA4 Whitmore Heath to Madeley

Overview

The Whitmore Heath to Madeley area is approximately 9.1km in length, extending from the Meece Brook valley in the south, to the west of Madeley in the north (see Figure 15). The area is predominantly rural in character with agriculture being the main land use interspersed with woodland, including ancient woodland, small villages and isolated residential properties and farmsteads. Settlements are located near the route at Baldwin's Gate, Whitmore, Whitmore Heath, Madeley and Madeley Park Wood.

The Proposed Scheme

On entering the area, the Proposed Scheme will pass on a short embankment, then through the Meece Brook valley on viaduct. The route will then transition to embankment followed by cutting before entering a tunnel under the A53 Newcastle Road and Whitmore Heath.

On exiting the tunnel, the route will pass through a section of Whitmore Wood in a retained cutting, before crossing the River Lea valley, the West Coast Main Line and the Stoke to Market Drayton Railway on viaduct. The route will then pass onto embankment and under Manor Road, before moving into cutting. The route will continue in cutting under the A525 Bar Hill Road before entering a tunnel west of Madeley, at Barhill Wood. The tunnel will emerge in cutting before transitioning to embankment and continuing into the South Cheshire community area.

In this area the Proposed Scheme will require the demolition of three residential properties. Snape Hall Road will be permanently closed where it crosses the route of the Proposed Scheme with users diverted via Heath Road. There will be the permanent closure of one public right of way (Madley Bridleway 5) with users diverted via the existing network. There will be

permanent widening, realignment, diversion or extension of 11 public rights of way and seven roads. Eight watercourses will be permanently diverted or realigned.

Eight civil engineering satellite compounds will be located within this area, one of which will continue to be used as a satellite compound for railway systems works following the completion of civil engineering works at that compound. Four additional satellite compounds for railway systems works will also be located in the area.

A borrow pit will be located to the west of Netherset Hey Farm.

Residual effects

Construction and operation of the Proposed Scheme in this area are not likely to result in any adverse residual effects on air quality, land quality, and socio-economics. No likely adverse residual effects have been identified as arising during operation for agriculture, forestry and soils, and water resources and flood risk.

Agriculture, forestry and soils

Construction

Land requirements during construction of the Proposed Scheme will affect 12 holdings due to the proportion of land required, disruption and/or severance. The viability of one holding and the associated farm shop at Baa Hill Farm will be jeopardised due to the construction of the Proposed Scheme.

Nine holdings will be permanently affected. This includes Rose Cottage and Land at Wood Croft, which are unlikely to remain as land holdings.

The land compensation code provides for compensation for the loss of agricultural land and for losses resulting from disturbance to agricultural activities.

Community

Construction

Effects associated with noise from, and views of, construction activities, and/or effects associated with heavy goods vehicle movements, in varying combinations, will affect residents at: 29 residential properties in Whitmore and

Whitmore Heath; 20 residential properties on Manor Road; 43 residential properties located on the A525 Bar Hill Road and Mallard Close; five residential properties at Moor Hall Farm and Bower End Farm.

Visitors to Madeley Cemetery will also be affected due to the combination of noise, visual and construction vehicle movement effects.

Operation

Noise from, and views of, the operation of the Proposed Scheme will affect residents at: seven residential properties on Snape Hall Road in Whitmore Heath; 14 residential properties on the A525 Bar Hill Road and Red Lane in Madeley.

Visitors to Madeley Cemetery will also be affected due to noise from, and views of, the operation of the Proposed Scheme.

Cultural heritage

Construction

Construction of the Proposed Scheme will result in the partial removal of a number of non-designated heritage assets, including for example: remains of a building that may date to

the Roman period; and extensive medieval and post-medieval agricultural landscape with fields, boundaries and hollow ways, east of Beechfield.

The construction of the Proposed Scheme will permanently affect the setting of the Grade II listed Hey House.

Operation

The operation of the Proposed Scheme will affect the settings of the Grade II listed Hey House. Over time, some visual effects will reduce as planting matures and the new railway integrates into the landscape.

Ecology and biodiversity

Construction

Construction of the Proposed Scheme in this area will result in the loss of 7ha of ancient woodland (6ha of which will be lost at Whitmore Wood, with the remainder from Barhill Wood, Wrinehill Wood, Hey Sprink and an unnamed wood south of Hey Sprink).

New woodland will be planted, which will help improve connections between areas of woodland.

Nine veteran trees will be removed.

New hedgerows will be planted to replace hedgerows lost as a result of construction of the Proposed Scheme. Following this replanting, the Proposed Scheme will result in the net loss of 2.8km of hedgerow. However, opportunities will be sought to retain or replace hedgerows within the land required for the Proposed Scheme for temporary works only. Reinstatement of existing hedgerows within the land required for temporary works will provide approximately 10.1km of hedgerow in addition to the new hedgerows planted, reducing the residual effect to a level that is not significant.

Landscape and visual

Construction

The presence of construction works and changes to the existing landform and vegetation patterns will affect the character and appearance of the local landscape.

Construction activities will be present in views throughout this area, including for example, from: Rectory Lane; Manor Road and to the

north of Madeley Park; Madeley Cemetery; residential properties on the A525 Bar Hill Road; and Wrinehill Wood.

Operation

During operation, the adverse effect of the Proposed Scheme on the character and appearance of the local landscape will substantially reduce over time as mitigation planting grows and matures, however effects will remain.

The presence of the Proposed Scheme will affect views throughout this area, including for example, from: Manor Road and farmland north of Madeley Park; Madeley Cemetery; Grafton's Wood; and Madeley Bridleway 2 close to intersection with Madeley Footpath 28.

Sound, noise and vibration

Construction

The proposed avoidance and mitigation measures will reduce noise inside residential properties from the construction activities, such that it does not reach a level where it will significantly affect residents.

Noise from construction is likely to increase noise levels outside residential properties in the following residential areas: Whitmore Heath and Bar Hill, Madeley.

Noise from construction traffic is likely to increase noise levels outside residential properties at locations along the following roads: Bent Lane; Snape Hall Road; Manor Road; and the A525 Bar Hill Road.

Construction noise will affect Hey House offices (associated with Edland Kennels/Cattery) and Madeley Cemetery.

HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid these significant adverse effects.

Operation

A number of mitigation measures have been included in the design of the Proposed Scheme to mitigate noise effects during operation, including noise screening at various locations in this area.

At individual residential properties, the mitigation measures, including noise insulation, will reduce noise inside the majority of residential properties such that it will not reach a level where it will significantly affect residents.



View from Moor Hill Farm on track off the A525 Bar Hill Road looking towards the proposed A525 Bar Hill overbridge and Madeley cutting (year 1 of operation)

Ground-borne noise from the operation of the Proposed Scheme will result in effects on the following residential properties above the proposed Whitmore Heath tunnel: The Brackens, Heath Road; West Ridge, Birch Tree Lane; and Wyndways, Heath Lane. HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid these significant effects.

Noise from operation is likely to increase noise levels outside residential properties in the following areas: Kennels Lane, Hill Chorlton; Heath Road, Birch Tree Lane and Heath Rise, Whitmore Heath; Snape Hall Road and Birch Tree Lane, Whitmore Heath; and A525 Bar Hill Road, Mallard Close and Red Lane, Madeley.

Noise from the operation of the Proposed Scheme will affect Hey House offices (associated with Edland Kennels/Cattery) and Madeley Cemetery.

HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid these significant adverse effects.

Traffic and transport

Construction

Construction traffic will cause additional congestion and increased delays for vehicle users at the A51 London Road/A53 Newcastle Road staggered crossroads junction.

Increases in traffic during construction will make it more difficult for non-motorised users to cross the following roads: the A51 London Road between Dog Lane and Checkley Lane; the A53 Newcastle Road between the A51 London Road and the A5182 Trentham Road; the A525 Bar Hill Road between the A51 London Road and the Proposed Scheme; the A525 Bar Hill Road between the Proposed Scheme and Manor Road; Manor Road between the Proposed Scheme and the A525 Bar Hill Road; and Snape Hall Road between Common Lane and the Proposed Scheme.

Temporary closure or diversions of public rights of way and roads will result in increased journey times for non-motorised users, and/or introduce level changes in the area, including for example, at: Whitmore Footpath 4; Whitmore Footpath 5; Madeley Bridleway 1; Madeley Footpath 7; and Madeley Footpath 24.

Operation

There will be a beneficial significant effect for users of Madeley Bridleway 5. This is because part of the bridleway (between Madeley Footpath 28 and Madeley Bridleway 2) will be permanently closed and diverted along an upgraded Madeley Footpath 28 (which will become a bridleway), which will reduce travel distance by approximately 200m.

Increased travel distances will affect non-motorised users of Snape Hall Road. Non-motorised users of Madeley Bridleway 2 will be affected due to a diversion via a bridge passing under the route of the Proposed Scheme.

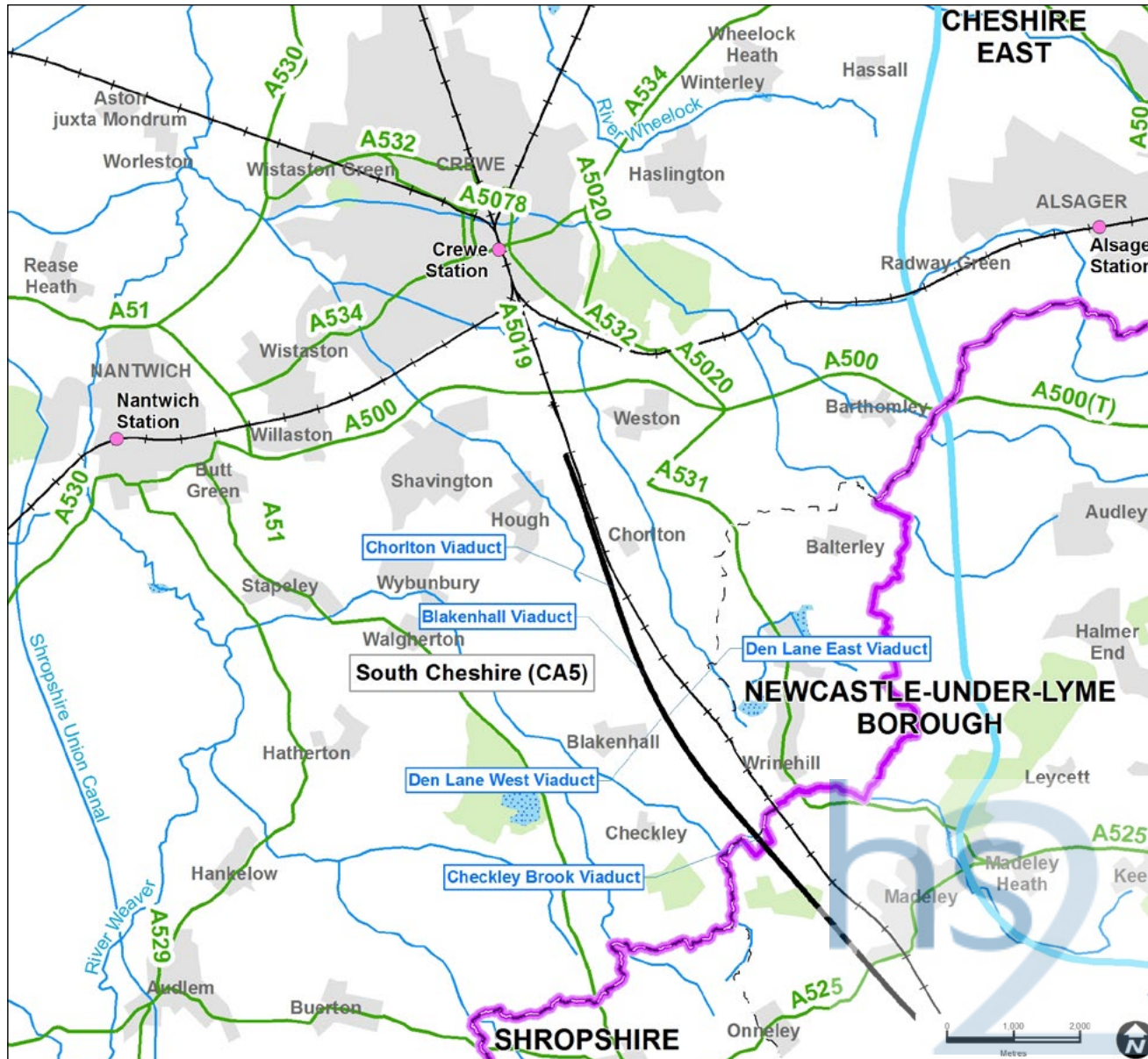
Water resources and flood risk

Construction

The proposed borrow pit will be adjacent to the River Lea west of Netherset Hey Farm. There is the potential for baseflow (water which helps feed the river) to be affected should groundwater levels be lowered in the borrow pit during excavation. Additional mitigation will be required and could take the form of a new lined channel and temporary diversion of the River Lea. Any additional mitigation will be designed in consultation with the Environment Agency.

Construction of the Proposed Scheme may have a temporary impact on groundwater feeding a licensed public groundwater abstraction near Whitmore. Mitigation options are being discussed with the owner and the Environment Agency, with a view to ensuring a continuous water supply during the construction period.

Figure 16: HS2 Phase 2a route - South Cheshire



8.6 CA5 South Cheshire Area

Overview

The route of the Proposed Scheme in the South Cheshire area covers an approximately 6.6km section of the HS2 main line and two spurs approximately 6km in length. The area extends from south-east of Checkley in the south to Crewe in the north (see Figure 16). The area is predominantly rural in character, interspersed with small villages, isolated residential properties and farms, becoming more urban in character as the route approaches Crewe. Settlements are located near the route at Checkley, Blakenhall, Chorlton, Hough, Basford, Shavington and Crewe.

Proposed Scheme

The route will enter the area south of Checkley Brook on viaduct and will then run on embankment before transitioning into a shallow cutting, passing under Checkley Lane overbridge towards the realigned Den Lane and Den Lane central underbridge.

The route will continue into cutting from Den Lane between the two proposed HS2 spurs, which are required to connect the route of the Proposed Scheme to the existing rail network. The route will then pass under the Blakenhall viaduct, which will carry the HS2 spur (southbound) to the east. The Proposed Scheme will continue through cutting, running parallel with the HS2 spurs, the new section of the West Coast Main Line and the existing West Coast Main Line. The route will enter a retained cutting to the south of Crewe for approximately 1.5km, passing beneath Newcastle Road before reaching a headwall. This will form the boundary between the route of the Proposed Scheme and Phase 2b.

Works will also be required at Crewe Station, including the construction of a new platform.

No residential properties will require demolition in this area. Chorlton Lane will be permanently closed, however a diversion will be put in place to maintain connectivity. Three public rights of way will be permanently closed (Checkley cum Wrinehill Footpath 15, Chorlton Footpath 11 and Chorlton Footpath 11) with users diverted via the existing network. There will be permanent widening, realignment, diversion or extension of 22 public rights of way and five roads. Five watercourses will be permanently diverted or realigned, two overhead lines will be raised and three high pressure gas mains diverted.

One main civil engineering compound and six civil engineering satellite compounds will be located within this area. Three of the civil engineering satellite compounds will continue to be used as compounds for railway systems works following the completion of civil engineering works, with two continuing as satellite compounds and one as a main compound (known as the Checkley Lane East main compound). There will be a further 13 additional satellite compounds and one main compound used for railway systems works.

A borrow pit will be located to the north of Checkley Lane.

Residual effects

Construction and operation of the Proposed Scheme in this area are not likely to result in any adverse residual effects on air quality, land quality and socio-economics. Similarly, no likely adverse residual effects have been identified as arising during operation for agriculture, forestry and soils, cultural heritage, and water resources and flood risk.

Interface with Phase 2b

The route which will be constructed as part of Phase 2a will terminate at a portal headwall. Provision is made in the design of the Proposed Scheme for the future extension of the route to Manchester as part of Phase 2b.

Development of HS2 Phase 2b will require a separate hybrid Bill and ES at a later date. The Phase 2b assessment will consider any potential effects at the interface between the Proposed Scheme and Phase 2b or any cumulative effects that could arise from the construction and operation of both schemes.

Interface with Crewe Hub

Network Rail and other stakeholders are developing proposals for an enhanced transport hub at Crewe (referred to as 'Crewe Hub').

Crewe Hub does not form part of the Proposed Scheme. It will be confirmed in due course how any necessary development consent would be secured for these emerging proposals, which would include an assessment of the effects arising from Crewe Hub.

The Crewe Hub proposal is at an early stage of development and there is insufficient information on which to base a robust assessment of in-combination construction effects. Nevertheless, the traffic and transport assessment considers the potential combined construction impacts of the Proposed Scheme and the Crewe Hub proposal, in the event that the latter proceeds at the same time as the Proposed Scheme. No residual significant effects have been identified in this assessment.

Agriculture, forestry and soils

Construction

Land requirements during construction of the Proposed Scheme will affect 19 agricultural holdings due to the proportion of land required, disruption and/or severance.

Thirteen agricultural holdings will be permanently affected, due to the proportion of land required, including Lower Den Farm and Oakhanger Hall. Chorlton Dairy Farmhouse is unlikely to remain as a land holding.

The land compensation code provides for compensation for the loss of agricultural land and for losses resulting from disturbance to agricultural activities.

Community

Construction

Effects associated with noise from, and views of, construction activities, and/or effects associated with heavy goods vehicle movements, in varying combinations will affect residents at: six properties on Checkley Lane; 12 residential properties on Den Lane, to the north of Wrinehill; 15 residential properties on Den Lane and Mill

Lane End, to the east of Blakenhall; 34 residential properties in Wychwood Park and Chorlton; nine properties on Chorlton Lane; two sites planned for housing, in Chorlton and St Clements Court, Crewe; 12 residential properties on Newcastle Road and Chorlton Lane; and eight properties on Casey Lane.

Operation

Noise from, and views of, the operation of the Proposed Scheme will affect residents at: five properties on Checkley Lane; six properties on Den Lane, to the north of Wrinehill; 17 properties on Den Lane and Mill Lane, to the east of Blakenhall; 38 properties in Wychwood Park and Chorlton; two sites planned for housing, in Chorlton and St Clements Court, Crewe; and nine properties on Chorlton Lane.

Cultural heritage

Construction

Non-structural changes to the Grade II 19th century railway station platform buildings at Crewe, leading to changes in its appearance, coupled with changes to the setting of the building, will lead to a significant effect.

Construction of the Proposed Scheme will result in the removal of a number of non-designated heritage assets, including for example: the demolition of Casey Bridge; and a possible moated site at Chorlton. Construction of the Proposed Scheme will result in the partial removal of a number of non-designated assets, including for example: the site of a former farmstead, south of Heath Farm; and earthworks and buried archaeological features in the area of Basford Hall.

The construction of the Proposed Scheme will permanently affect the setting of the Grade II listed Basford Bridge Cottage. However, removal of the existing Newcastle Road immediately adjacent to the cottage and additional landscape planting will help improve its setting.

The remnant landscape of Crotia Mill Farm will be partially removed by a planned mixed-use development. Construction of the Proposed Scheme will further affect this as it will result in the further partial removal of the remnant landscape.

Ecology and biodiversity

Construction

Three veteran trees will be removed as a result of the construction of the Proposed Scheme.

New hedgerows will be planted to replace those lost as a result of the construction of the Proposed Scheme. This represents a net gain in hedgerow of approximately 3.9km.

Health

Construction

Chorlton Lane will be permanently closed to the north of the existing West Coast Main Line, isolating nine properties from the rest of Chorlton village. This will reduce the social connections between these communities.



View from Gonsley Green Farm looking towards the proposed Chorlton South embankment and the Blakenhall viaduct (year 1 of operation)

Landscape and visual

Construction

The presence of construction works and changes to the existing landform and vegetation patterns will affect the character and appearance of the local landscape.

Construction activities will be present in views throughout this area, including for example, from: Checkley Lane and Turncocks Lane; from residential properties along Mill Lane and Blakenhall Footpath 4; Basford Footpath 6; Newcastle Road on the edge of Hough; and Weston Lane near Basford Hall.

Operation

During operation, the effect on the character and appearance of the local landscape will substantially reduce over time as mitigation planting grows and matures, however, effects will remain significant.

The operation of the Proposed Scheme will affect views, from the following: farmland north of Checkley Brook; the junction of Mill Lane and Den Lane; Gonsley Green Farm; and from Chorlton Lane.

Sound, noise and vibration

Construction

The proposed avoidance and mitigation measures will reduce noise inside the residential properties from the construction activities, such that it does not reach a level where it will significantly affect residents.

Noise from construction is likely to increase noise outside residential properties in the following areas: Higher Den House, Den Lane Wrinehill; Mill Lane and Den Lane, Lane End Farm, Chorlton Lane; Freshwater Drive, St Clements Court, Henley Road and Chiltern Close; and Casey Lane and Newcastle Road. Construction traffic will increase noise levels outside residential properties along Den Lane between the route of the Proposed Scheme and Wrinehill.

HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid these significant adverse effects.

Operation

A number of mitigation measures have been included in the design of the Proposed Scheme to mitigate noise effects during operation, including noise screening at various locations in this area.

At individual residential properties, the mitigation measures, including noise insulation, will reduce noise inside the residential properties, such that it will not reach a level where it will significantly affect residents. Noise from the operation of the Proposed Scheme is likely to increase noise levels outside residential properties in the following areas: Checkley Lane; Higher Den House, Den Lane, Wrinehill; Mill Lane and Den Lane, Mill Lane End; Land End Farm, Chorlton Lane; Chiltern Close, Freshwater Drive, St Clements Court and Henley Road.

HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid these significant adverse effects.

Traffic and transport

Construction

Construction traffic will cause congestion and delays for vehicle users at the following junctions: the A500 Shavington Bypass/B5472 Weston Road/A531 Newcastle Road roundabout; the A500 Shavington Bypass/A5020 David Whitby Way roundabout; and the A500 Shavington Bypass/B5071 Jack Mills Way roundabout.

Increases in traffic during construction will make it more difficult for non-motorised users to cross roads throughout this area, including for example, at: the A51 London Road between Checkley Lane and the B5071 Wybunbury Road; the A531 Newcastle Road between the A531 Weston roundabout and the A500 Meremoor roundabout; Den Lane between Wrinehill Road and the West Coast Main Line; Wybunbury Road between the A51 London Road and Wrinehill Road; and Wrinehill Road between Bridge Street and Den Lane.

Temporary closure or diversion/realignment of public rights of way and roads will increase travel distances for non-motorised users on the following: Checkley cum Wrinehill Footpath 5; Checkley cum Wrinehill Footpath 15; Blakenhall Footpath 7; Blakenhall Footpath 11; Blakenhall Footpath 17; Chorlton Footpath 8 and Basford Footpath 5.

Operation

The Proposed Scheme will increase the number of rail passengers using Crewe Station each day by 2.1%. When combined with HS2 Phase One, there will be a combined total increase of daily passenger numbers of 6.9%, which will cause congestion at: the A534 Crewe Road/A532 Weston Road roundabout junction; the A534 Nantwich Road/Mill Street signal junction; and the A534 Nantwich Road/Gresty Road signal junction. This increase in people will also increase demand on parking and drop off facilities at Crewe Station. These effects are unchanged from those assessed for HS2 Phase One alone.

The permanent closure of the Chorlton Lane underbridge will increase travel distances for vehicle users travelling from the east to the west of the Proposed Scheme.

Non-motorised users will experience increased travel distances as a result of the closure of Checkley cum Wrinehill Footpath 15 and Chorlton Footpath 11 and Chorlton Footpath 12.

The creation of Blakenhall New Bridleway and the extension of Chorlton Bridleway 2 will increase the bridleway network, resulting in beneficial effects.

Permanent realignment, diversions or extensions of public rights of way and roads will result in increased journey time for non-motorised users, and/or introduce level changes (for example in the form of bridges or underpasses) in the area, including for example, at: Checkley cum Wrinehill Footpath 5; Blakenhall Bridleway 12; Chorlton Footpath 3; Den Lane; and Newcastle Road.

Water resources and flood risk

Construction

Construction of the Proposed Scheme could have an impact on a potential spring near Basford House. If this is confirmed as a spring, its loss would result in a significant adverse effect and measures would be implemented to mitigate this effect.

The proposed Basford Brook bridge, and associated highway embankment, have been included within the Proposed Scheme. Hydraulic modelling has not been undertaken as part of the assessment of the Proposed Scheme. Therefore, it has been assumed that the bridge could have a minor impact on flood risk, which would result in a significant adverse effect. The design of this crossing and embankment will be informed by a hydraulic modelling assessment, with a view to ensuring that this does not increase the flood risk.

9. Summary of route-wide environmental effects

9.1 Introduction

This section presents a summary of the likely residual significant effects that have been identified on a route-wide basis. Route-wide effects are those that occur at a larger scale than that presented in the community area reports and for which a route-wide assessment is therefore appropriate.

9.2 Cannock Chase Area of Outstanding Natural Beauty

No significant route-wide effects have been identified for the Cannock Chase Area of Outstanding Natural Beauty.

The assessment also considered Shugborough Park and Shugborough Hall and concluded that these will not experience route-wide significant effects due to distance from the Proposed Scheme, existing vegetation and surrounding topography.

9.3 Agriculture, forestry and soils

Overall, the agricultural land required for the Proposed Scheme will amount to approximately 2,090ha, of which approximately 1,370ha will be high quality land. This represents a very small

percentage (approximately 0.03%) of the total high quality agricultural land in England.

Following construction and restoration to agricultural land, the area of land that will be permanently removed from agricultural use will be approximately 1,010ha, of which 700ha will be high quality agricultural land. This represents approximately 0.02% of the total high quality land in England.

9.4 Climate

As with Phase One, the Proposed Scheme will play a key part of the UK's future low-carbon transport system and will support the Government's overall carbon objectives. In comparison with most other transport modes, high speed rail offers some of the lowest carbon emissions per passenger kilometre, and significantly less than cars and planes.

As a yearly average, the Proposed Scheme's carbon footprint over the course of the construction period will represent less than 1% of the UK's annual construction carbon footprint (based on the UK's annual construction emissions in 2026).

During operation, the Proposed Scheme's greenhouse gas emissions represent a small contribution to the UK's predicted annual emissions, being equivalent to less than 0.01% of all of the UK's transport related carbon emissions in 2027.

These will decline in line with the continuing replacement of fossil fuel power stations to generate electricity by low-carbon alternatives.

9.5 Ecology

Habitats

Approximately 107.8ha of habitats of principal importance will be lost overall, including up to 42.7ha of lowland mixed deciduous woodland. Where reasonably practicable, ecological compensation areas will be created to provide habitats of principal importance. A total of approximately 394ha of habitats of principal importance will be created.

Habitats that will be lost include 6.2ha of ancient woodland from two sites, Whitmore Wood and Barhill Wood. Following work undertaken by HS2 Ltd, it is understood that Natural England will be adding additional woodlands to the Ancient Woodland Inventory. Land will be required from eight of these additional ancient woodlands, and 4.3ha of ancient woodland will be lost from these sites.

The loss of ancient woodland is a significant adverse effect that cannot be mitigated. It will be partly compensated through a range of measures, including translocation of soils to appropriate receptor sites and creating linkage between ancient woodland fragments to increase connectivity. Other measures, such as planting native tree and shrub species of local provenance, and translocation of coppice stools and dead wood, will be undertaken as appropriate.

Extensive new woodland planting will increase the area of broadleaved woodland and enhance woodland connectivity.

Twenty-seven ancient or veteran trees will be lost across the route of the Proposed Scheme. This loss is likely to represent approximately

0.02% of the resource in England. Where loss of these trees is unavoidable they will be soft felled and sections placed within retained habitats to provide a deadwood resource.

Approximately 1.5ha of inland saltmarsh will be lost. HS2 Ltd will consider opportunities to enhance existing inland saltmarsh habitats to provide suitable off-site compensation.

Species

The construction of the Proposed Scheme will result in the loss of barn owl territories and, during operation, barn owls are also at risk of being struck by passing trains. HS2 Ltd will pursue opportunities with local landowners, such as the provision of owl nesting boxes to help increase barn owl populations away from the route of the Proposed Scheme.

9.6 Health

The Proposed Scheme, and associated mitigation, has been designed to reduce adverse impacts on health, however, health impacts may still occur.

Transport

The Proposed Scheme will cross a number of public rights of way and construction will take place in proximity to others. This may make these routes less attractive to users, potentially reducing levels of physical activity and associated health and wellbeing benefits.

Construction traffic has the potential to obstruct or discourage non-motorised users on a number of routes and people may choose to travel by car, temporarily reducing levels of physical activity and associated health and wellbeing benefits.

Construction traffic has been identified as a key concern for local residents. Concerns about road safety have the potential to affect wellbeing, through anxiety and a reduction in levels of walking or cycling to school.

Construction of the Proposed Scheme will result in delays and disruption to vehicle journeys. Temporary road closures will also create uncertainty and increases in heavy goods vehicles on some roads may increase fear of accidents. These changes may result in stress during journeys, which may deter people from travelling on affected routes.

Employment and training

The Proposed Scheme will increase opportunities for employment and training during the construction phase and communities within commuting distance will potentially benefit.

Construction worker spending and additional demand for goods and services for construction may also create additional employment opportunities. This may result in improved income and employment status, leading to associated potential health and wellbeing benefits.

The level of potential job losses due to business displaced by the construction of the Proposed Scheme will be very small in the context of local and regional employment levels. Some individuals may be adversely affected, particularly those less able to adapt due to personal circumstances and vulnerabilities (e.g. workers on low incomes or with impaired mobility may face difficulties commuting to a new location). This may lead to potential adverse health and wellbeing effects.

Housing

Twenty-six residential properties will be demolished along the route of the Proposed Scheme, meaning occupants will need to relocate. This may result in wellbeing effects on people required to move, through for example, increased levels of stress.

Residential properties within or close to the land required for the Proposed Scheme may be affected by blight, which may cause anxiety for homeowners.

Where residential properties will be demolished, displaced owners and occupiers will be entitled to receive compensation under existing statutory compensation arrangements. The Government has also developed a package of property measures which includes provision for atypical properties and special circumstances.

Neighbourhood quality

Construction activities and noise and visual effects from passing trains during operation may affect neighbourhood quality in areas close to construction sites and the Proposed Scheme.

Construction workforce

The introduction of the temporary construction workforce into existing communities is likely to be noticeable in communities along the line of the route. This has the potential to negatively alter people's perceptions about their communities, which may adversely affect wellbeing and deter people from using local community facilities.

However, the presence of the temporary workforce may also have a beneficial effect on local communities through increased use of local services and opportunities for social interaction.

Operational noise

Noise from the operation of the Proposed Scheme has the potential to cause sleep disturbance, annoyance and health related issues for those living in close proximity to the route of the Proposed Scheme.

9.7 Socio-economics

HS2 Ltd estimates that the Proposed Scheme will create the equivalent of approximately 2,240 full time construction jobs. Depending on the skill levels required, these jobs will be available to local people along the route.

HS2 Ltd estimates that the equivalent of a further 840 full-time jobs will be created by the suppliers of goods and services to construct the Proposed Scheme and through the money that construction staff will spend in the local area.

During operation, an estimated 100 jobs will be created at the Stone infrastructure maintenance base - rail (IMB-R).

9.8 Traffic and transport

The Proposed Scheme will result in shorter journey times. Fastest typical journey times with and without the Proposed Scheme are shown in Table 1 of this NTS.

Table 1 shows that the Proposed Scheme will reduce journey times by up to 13 minutes from London, to destinations including Crewe, Manchester Piccadilly and Liverpool Lime Street.

When combined with Phase One, the Proposed Scheme will reduce journey times between London and Manchester Piccadilly by approximately 37 minutes and between London and Crewe by approximately 35 minutes. These travel time savings represent a beneficial effect.

The Proposed Scheme will provide relief to the conventional rail network as well as beneficial reductions in long-distance travel by car (as people shift from travelling by car to train). When combined Phase One, this will create a beneficial effect.

9.9 Waste and material resources

Construction of the Proposed Scheme will result in the generation of approximately 39.7 million tonnes of excavated materials. Over 98% (39 million tonnes) will be reused in the construction of engineering embankments, landscape earthworks included in the design, as well as in the restoration of borrow pits. Overall, construction of the Proposed Scheme will require almost 737,000 tonnes of waste to be disposed of to landfill (91% to inert landfill, 7% to non-hazardous landfill and 2% to hazardous landfill). Over 92% (680,000 tonnes) of this waste will come from excavation, the remaining almost 8% (57,000 tonnes) being waste from demolition, construction and worker accommodation sites.

As noted in the Phase One ES, the amount of non-hazardous waste disposed to landfill during the construction of Phase One will result in a minor adverse effect. When combined with the additional amount from the construction of the Proposed Scheme, this effect will increase to moderate.

10. Summary of off-route environmental effects

10.1 Introduction

The off-route effects assessment describes the likely residual effects associated with: changes and/or works at off-route railway stations; modifications to the existing Crewe to Manchester line (part of the West Coast Main Line) north of Crewe; and modifications to existing highways at off-route locations.

10.2 Off-route railway stations

Conventional railway stations selected for assessment are those that are predicted to experience a greater than 10% increase in the number of passengers, or an increase of over 700 daily passengers, as a result of the Proposed Scheme and Phase One combined. These railway stations are Preston and Warrington Bank Quay. The Proposed Scheme and Phase One in combination will give rise to changes in passenger numbers and increased traffic on local roads close to the two railway stations.

Residual significant effects

Traffic and transport

The forecast increase in daily passengers due to the Proposed Scheme and HS2 Phase One

in combination may increase pressure on car parking and drop off facilities at Warrington Bank Quay station, leading to a significant effect.

No likely significant effects have been identified as a result of increased passenger use at Preston Station during operation.

10.3 Modifications to the Crewe to Manchester Line (part of the West Coast Main Line) north of Crewe

To facilitate the HS2 services that will run on the conventional Crewe to Manchester line north of Crewe, there is a need to make minor modifications to the track alignments of the Crewe to Manchester line in two locations, Maw Green and Sandbach, to include additional switches and crossings. These will maintain operational flexibility, while HS2 services are using this line, prior to the opening of HS2 Phase 2b.

Residual significant effects

Traffic and transport

The works to the West Coast Main Line at Sandbach will require an existing footbridge to be raised, which means this will be closed for

approximately three months. During the closure period, non-motorised users will have to cross the West Coast Main Line using the A533 London Road bridge, a diversion of approximately 220m.

10.4 Modifications to existing highways

Off-route highway modifications will be required at 12 locations to facilitate the construction and maintenance of the Proposed Scheme. These modification works include: kerb realignments and widening at junctions to allow safe turning and passing of construction vehicles.

Residual significant effects

Cultural heritage

Temporary modifications to Great Haywood Road will temporarily affect the setting of the following designated heritage assets: the graveyard at the Grade II listed Church of St John the Baptist; the Tixall Conservation Area; and the Grade I listed Tixall Gatehouse. However, the effects on setting are largely reversible in nature and will be restricted to the duration of the construction works.

Ecology and biodiversity

Temporary modifications to Great Haywood Road and Yarnfield Lane will result in the loss of trees. If any of these trees are found to be ancient or veteran, this will result in a significant adverse effect.

Landscape and visual

The temporary modifications to Uttoxeter Road, Great Haywood Road, Yarnfield Lane and the A525 Bar Hill Road will affect the character and appearance of the local landscape. However, as reported in Section 8, the local landscape and views will be affected by the wider construction of the Proposed Scheme and these modifications will not change the effect.

High Speed Two (HS2) Limited
Two Snowhill
Snow Hill Queensway
Birmingham B4 6GA

08081 434 434
HS2Enquiries@hs2.org.uk