High Speed Two Phase 2a: West Midlands to Crewe

Working Draft Environmental Impact Assessment Report

Volume 2: Community Area report

CA5: South Cheshire

September 2016

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Department for Transport

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Structure of the working draft Environmental Impact Assessment Report

This document is part of the working draft Environmental Impact Assessment (EIA) Report for Phase 2a of the proposed High Speed Two (HS2) rail network between the West Midlands and Crewe (the Proposed Scheme). The working draft EIA Report sets out the current design of the Proposed Scheme, the likely environmental impacts (and, where possible, the potential likely significant environmental effects) of the construction and operation of the Proposed Scheme and proposed mitigation measures. The assessment will be updated for the formal EIA Report to reflect further work on the design, assessment and mitigation between now and when the hybrid Bill is deposited.

The working draft EIA Report documentation comprises the following:

Non-technical summary

This provides a summary in non-technical language of:

- the Proposed Scheme and reasonable alternatives considered;
- the impacts of the Proposed Scheme (and where possible, the likely significant environmental effects), both beneficial and adverse; and
- the proposed means of avoiding, reducing or managing the likely significant adverse effects.

Volume 1: Introduction and methodology

This provides:

- a description of HS2, the EIA process and the approach to consultation and engagement;
- details of the permanent features of the Proposed Scheme and generic construction techniques, based on the current level of design;
- a summary of the scope and methodology for the environmental topics; and
- a summary of the strategic, route-wide and route corridor alternatives to the scheme and local alternatives considered prior to November 2015.

Volume 1 also comprises a glossary of terms and list of abbreviations and two appendices which are listed below.

Volume 2: Community area reports and map books

These cover the following community areas: 1 Fradley to Colton; 2 Colwich to Yarlet; 3 Stone and Swynnerton; 4 Whitmore Heath to Madeley; and 5 South Cheshire. The reports provide the following for each area:

- an overview of the area;
- a description of the construction and operation of the Proposed Scheme within the area, based on the current level of design;

- a summary of the local alternatives considered since November 2015;
- a description of the environmental baseline;
- a description of the environmental impacts of the Proposed Scheme (and where possible, the likely significant environmental effects), both beneficial and adverse; and
- the proposed means of avoiding, reducing or managing the likely significant adverse effects.

The maps relevant to the South Cheshire area are provided in a separate corresponding document entitled Volume 2, CA5 Map Book, which should be read in conjunction with this report. These maps include the location of the key environmental features (Map Series CT-10), key construction features (Map Series CT-05) and operation features (Map Series CT-06) of the Proposed Scheme. There are also specific maps showing proposed viewpoint and photomontage locations (Map Series LV, to be read in conjunction with Section 11, Landscape and visual), noise contour maps (Map Series SV, to be read in conjunction with Section 13, Sound, noise and vibration) and maps showing key water features (Map Series WR, to be read in conjunction with Section 15, Water resources and flood risk).

Volume 3: Route-wide effects

This describes the impacts and effects that are likely to occur at a geographical scale greater than the community areas described in Volume 2.

Glossary of terms and list of abbreviations

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

Appendix: Alternatives report

This describes the evolution of the Proposed Scheme and the reasonable alternatives considered.

Appendix: Draft Code of Construction Practice (CoCP)

This sets out the measures and standards to provide effective planning, management and control of potential impacts on both individuals, communities and the environment during construction.

1 Introduction

1.1 Introduction to HS2

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

1.1.2 HS2 will be built in phases. Phase One comprises the first section of the HS2 network of approximately 230km (143 miles) between London, Birmingham and the West Midlands that will become operational in 2026. It was the subject of an Environmental Statement (ES) deposited with the High Speed Two (London – West Midlands) Bill in 2013 and ES deposited with Additional Provisions to that Bill in 2014 and 2015. The Bill is currently proceeding through Parliament with the aim of achieving Royal Assent by the end of 2016 and commencing construction in 2017.

1.1.3 Phase Two of HS2 would extend the line to the north-west and north-east, to Manchester with connections to the West Coast Main Line (WCML) 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'.

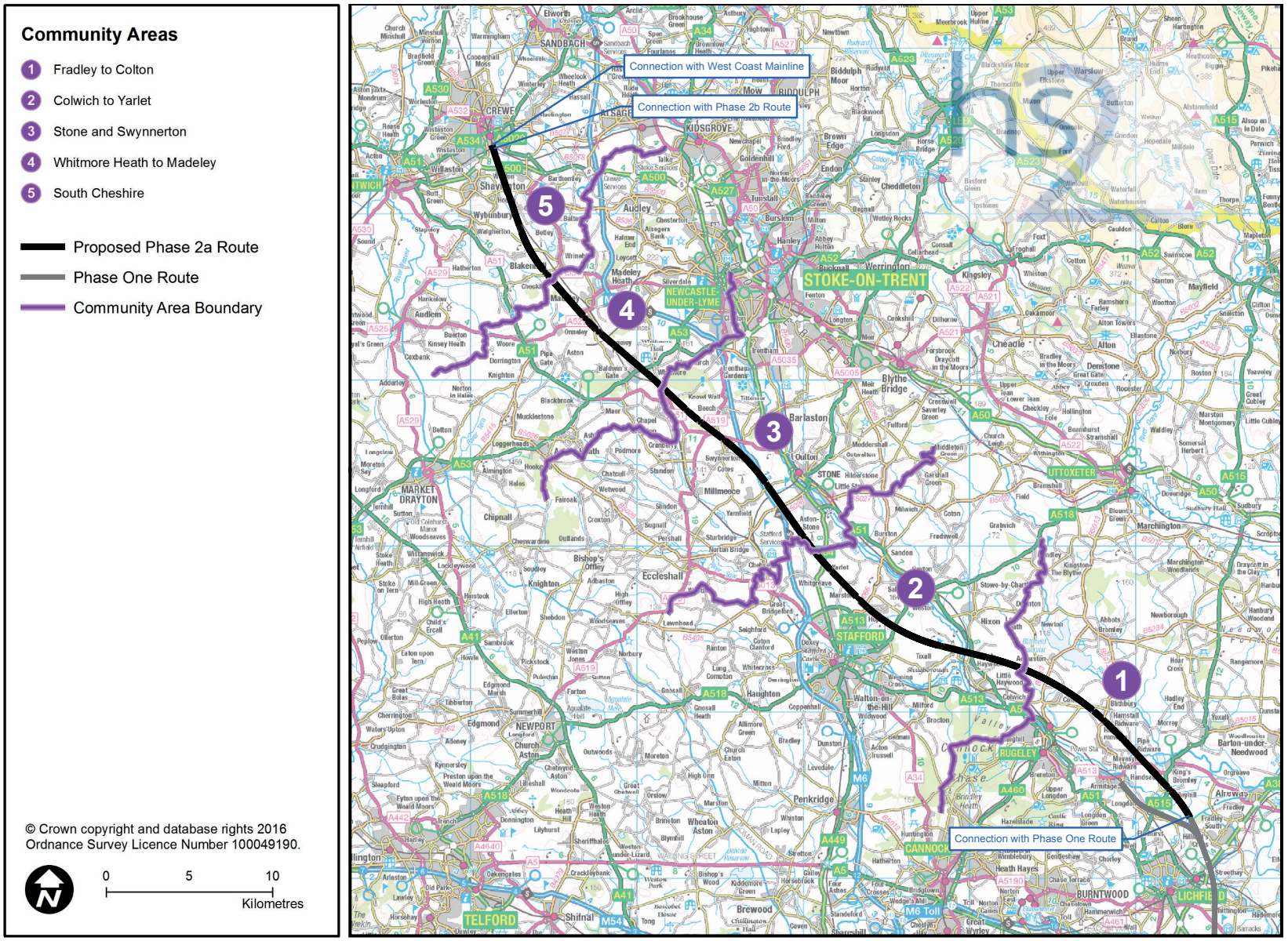
1.1.4 Phase 2a (the Proposed Scheme), the subject of this working draft Environmental Impact Assessment (EIA) Report[1], comprises the first section of the western leg of Phase Two from the West Midlands to Crewe (approximately 60km (37 miles) in length). It would connect with Phase One near Fradley, to the north-east of Lichfield, and connect to the WCML south of Crewe, to provide onward services beyond the HS2 network, to the north-west of England and to Scotland. Construction of the Proposed Scheme would commence in 2020, ahead of the rest of Phase Two, with operation planned to start in 2027 one year after the opening of Phase One. This is six years earlier than originally planned bringing some of the benefits of HS2 to the North sooner.

1.1.5 An announcement on the Phase Two route from Crewe to Manchester and from the West Midlands to Leeds, referred to as Phase 2b, is expected in Autumn 2016. Construction of Phase 2b would commence in approximately 2023, with operation planned to start around 2033.

1.1.6 The proposed Phase 2a route has been divided into five community areas (CA), for environmental assessment and community engagement purposes. These are shown in Figure 1.

[1] Note that Parliament's Standing Order 27A makes reference to production of an environmental statement (ES). Under the EIA Directive 2014/52/EU, the output of the environmental assessment is an Environmental Impact Assessment (EIA) Report. This report uses the term EIA Report where referring to the output of the EIA. This 'working draft' EIA Report provides an initial environmental assessment of the current stage of design.

Figure 1: The HS2 Phase 2a route and community areas



1.2 Purpose of this report

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

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

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

1.2.4 The likely significant environmental effects of the Proposed Scheme will be described in the formal EIA Report to be deposited in accordance with the requirements of Parliamentary Standing Order 27A (SO27A)[2,3]. It is possible that the effects and mitigation described in the formal EIA Report may differ from those presented in this working draft EIA Report, due to the provisional nature of the environmental and design information that is currently available and as a result of consultation on the Proposed Scheme, as appropriate.

1.3 Structure of this report

1.3.1 This report is divided into the following sections:

- Section 1 – an introduction to HS2 and the purpose and structure of this report;
- Section 2 – overview of the community area, description of the Proposed Scheme within the community area and its construction and operation, and a description of the local alternatives considered;
- Section 3 – consultation and stakeholder engagement; and
- Sections 4 to 15 – an assessment of the following environmental topics:
  - agriculture, forestry and soils (Section 4);
  - air quality (Section 5);
  - community (Section 6);

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

- cultural heritage (Section 7);
- ecology and biodiversity (Section 8);
- health (Section 9);
- land quality (Section 10);
- landscape and visual (Section 11);
- socio-economics (Section 12);
- sound, noise and vibration (Section 13);
- traffic and transport (Section 14); and
- water resources and flood risk (Section 15).

1.3.2 Each environmental topic section comprises:

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

1.3.3 Following consultation on this working draft EIA Report the proposed mitigation measures may be amended to take account of design changes and comments received. Mitigation measures will be set out in full in the formal EIA Report.

1.3.4 Environmental effects have been assessed in accordance with the methodology set out in Volume 1 and the draft Scope and Methodology Report (SMR)[4]. The draft SMR was consulted on between 8 March and 13 May 2016 and subsequently updated to take in consideration comments received. The revised SMR is published alongside this working draft EIA Report, which will be used to develop the formal EIA Report.

1.3.5 The maps relevant to the South Cheshire area are provided in a separate corresponding document entitled Volume 2, CA5 Map Book, which should be read in conjunction with this report.

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

[4] https://www.gov.uk/government/consultations/hs2-phase-two-west-midlands-to-crewe-draft-environmental-impact-assessment-scope-and-methodology-report-consultation

2 Overview of the area and description of the Proposed Scheme

2.1 Overview of the area

General

2.1.1 The South Cheshire area covers an approximately 8km section of the Proposed Scheme passing through the parishes of Checkley cum Wrinehill, Blakenhall, Hough and Chorlton and Weston and Basford and lies within the Cheshire East Council (CEC) area. The boundary between Madeley and Checkley cum Wrinehill parishes forms the southern boundary of this section. The route ends at the boundary between Weston and Basford and Crewe Town Council parishes.

2.1.2 As shown in Figure 2 the Whitmore Heath to Madeley community area (CA4) lies to the south. The north of the area marks the end of the Proposed Scheme, where it would connect to the WCML and in future connect with Phase 2b.

Settlement, land use and topography

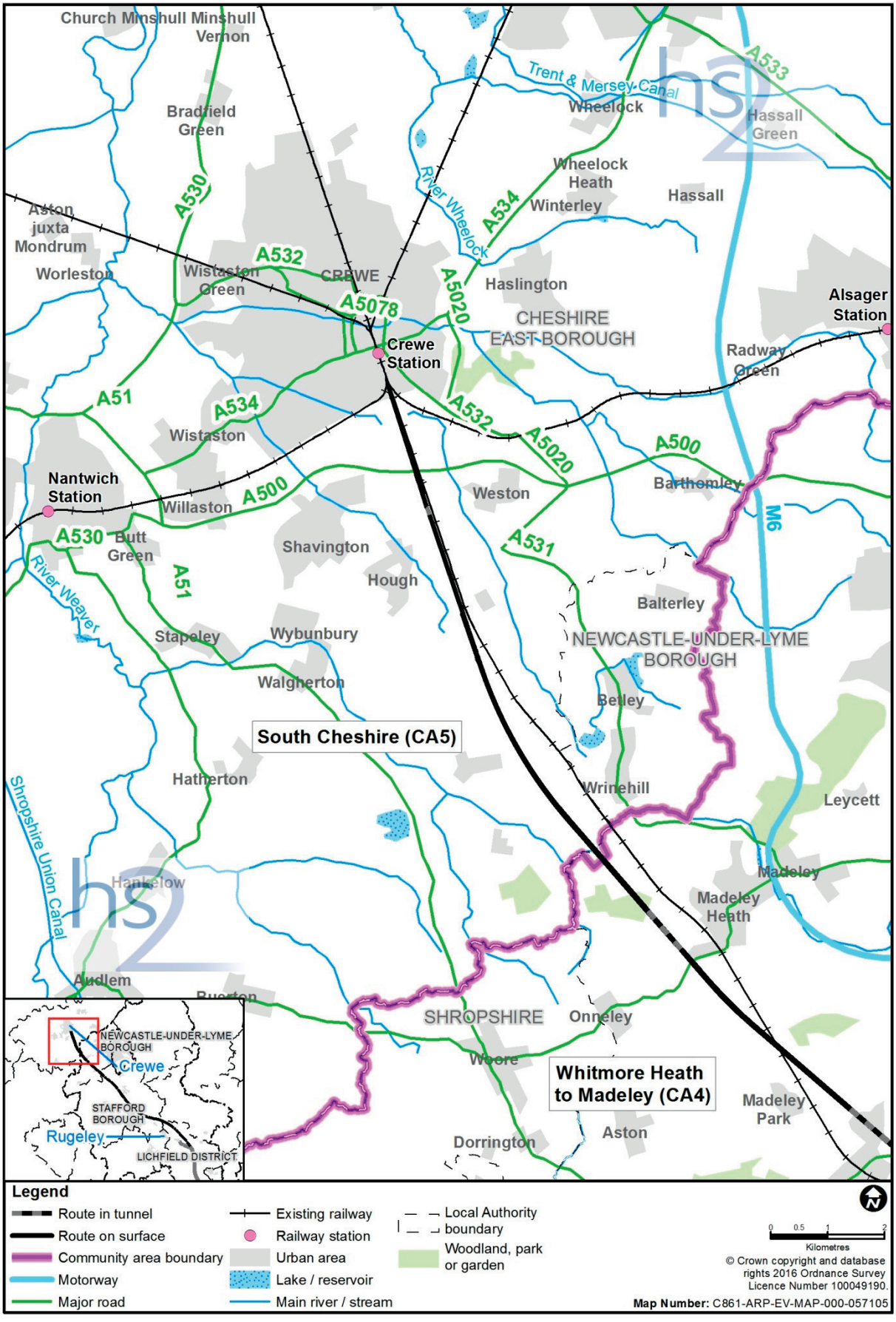
2.1.3 The southern extent of the South Cheshire area is predominantly rural in character, with agriculture being the main land use, interspersed with small villages and a scattering of isolated dwellings and farmsteads. The main residential areas are Wrinehill, Chorlton, Hough, Basford and Weston.

2.1.4 The northern extent of the South Cheshire area becomes mostly urban towards Crewe, which is a large town of approximately 84,000 residents, and a range of services and community facilities, including a railway station, the Crewe Alexandra football stadium, shopping centres and a university campus.

2.1.5 The Proposed Scheme would extend from Madeley in the south to the Crewe urban fringe in the north. The area encompasses a rolling to flat landscape of settled river valley landscapes and slopes, with urban fringe influences increasing towards Crewe. Wooded stream valleys and small tracts of woodland, including ancient woodland, are features in the landscape, notably Checkley Wood and Basford Brook.

2.1.6 Other key features are the highly valued landscape of Crewe Hall, a Grade II Registered Historic Park and Garden forming the setting for the listed hall. Wychwood Park and Border Fisheries are designed landscapes that have influenced the wider rural setting. The village of Betley has a diverse range of natural and historic features that contribute to local landscape value and a number of settlements are associated with the rural lane network, notably Hough, Checkley and Wrinehill.

Figure 2: Area context map



Key transport infrastructure

2.1.7 Principal highways within this area include the M6, which runs in a north to south alignment to the east of Crewe; the A500 Newcastle Road/Shavington Bypass, which links Nantwich to the south of Crewe and the M6 at junction 16; the A51 Nantwich Bypass, which connects the western outskirts of Crewe to settlements to the south; the A532 Weston Road, which passes through Crewe town centre; the A534 Crewe Road, which connects Crewe with Nantwich and Sandbach; and the A531 Newcastle Road, which connects Crewe with the settlements of Chorlton, Betley, Wrinehill and Madeley Heath.

2.1.8 Bus services travel through the area on their way to the central hub of Crewe. There is one bus corridor that crosses the route of the Proposed Scheme and follows the A500 Shavington Bypass via Shavington and Weston.

2.1.9 National and local rail services are accessible at Crewe railway station, which is a major rail interchange. At Crewe railway station, the WCML connects with the Crewe to Derby Line, the Crewe to Manchester Line and the Crewe to North Wales Line. These connections provide access to major destinations, including London, Liverpool, Manchester, Birmingham, Cardiff and Glasgow.

2.1.10 Within the area there are a number of public rights of way (PRoW) and local access roads that provide important links throughout Crewe town centre and between scattered rural dwellings and villages throughout the area.

Socio-economic profile

2.1.11 The South Cheshire area lies within the administrative area of CEC and the Cheshire and Warrington Local Enterprise Partnership (LEP) area. Within the CEC area there is a wide spread of business types reflecting a diverse range of commercial activities. Professional, scientific and technical businesses account for the largest proportion (18%), followed by retail (10%) and construction (8%).

2.1.12 According to the Annual Population Survey (2015), the employment rate within the CEC area was 77%, which is higher than the national figure of 74%[5]. In 2015, unemployment in the CEC area was 3%[6]. According to the Annual Population Survey (2015), 38% of CEC area residents aged 16 to 64 were qualified to National Vocational Qualification Level 4 (NVQ4) and above, while 8% of residents had no qualifications[7].

Notable community facilities

2.1.13 There are limited community facilities within the southern extent of the South Cheshire area. In general, community facilities such as GP surgeries, schools and community meeting places lie within the village centres, with the majority of these facilities found at Wrinehill, Hough and Chorlton. The town of Crewe, located in the northern extent of the South Cheshire area, contains a larger range of shops, services

[5] Data comes from the 2014 business register and employment survey.
[6] Office for National Statistics UK Business: Activity, Size and Location 2014; https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/ukbusinessactivitysizeandlocation ; Accessed: 11 January 2016.
[7] Office of National Statistics (2015) Annual Population Survey claimants as a percentage of economically active persons aged 16 – 64 (includes employees, self-employed and actively seeking work)

and community facilities. Notable community facilities include Crewe railway station, the Crewe Alexandra football stadium, shopping centres and the Manchester Metropolitan Cheshire university campus.

Recreation, leisure and open space

2.1.14 The Proposed Scheme would cross three promoted[8] public right of way (PRoW) routes (Crewe and Nantwich Circular Walk, Two Saints Way and South Cheshire Way Footpath), which follow the route of Chorlton Footpath 7 as it crosses the WCML to the west of Chorlton. There are also recreational cycle routes along this section of the route, which include the National Cycle Route 70, following Casey Lane, and the National Cycle Route 551, which follows Basford Lane.

Policy and planning context

Planning framework

2.1.15 HS2 is not included or referred to in many local plans, given that it is being developed on a national basis to meet a national need. Relevant local plan documents and policies have nevertheless been considered in relation to environmental topics, as part of considering the Proposed Scheme in the local context.

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

- Adopted Borough of Crewe and Nantwich Replacement Local Plan 2011 (saved policies) (2005)[9];
- Adopted Cheshire Replacement Minerals Local Plan (saved policies) (1999)[10]; and
- Adopted Cheshire Replacement Waste Local Plan (saved policies) (2007)[11].

2.1.17 Emerging policies are not generally considered within this report unless a document has been submitted to the Secretary of State for approval. This is the case with Cheshire East Council, Cheshire East Local Plan Strategy Submission Version, which was submitted to the Secretary of State on the 20th May 2014[12].

2.1.18 There are a number of key planning designations in the area. These include conservation areas, listed buildings, scheduled monuments, important archaeological sites, historic parks and gardens and ancient woodland.

2.1.19 There are a number of key planning designations in the area. These include conservation areas, listed buildings, scheduled monuments, important archaeological sites, historic parks and gardens and ancient woodland.

[8] Promoted PRoW refers to those PRoW which are "promoted" destinations in their own right as a recreational resource.
[9] http://www.cheshireeast.gov.uk/PDF/En-LDF-CNBCLocalPlan.pdf
[10] http://www.cheshireeast.gov.uk/pdf/En-LDF-CRepMLP-99.pdf
[11] http://www.cheshireeast.gov.uk/pdf/En-LDF-WasteLocPlan.pdf
[12] http://www.cheshireeast.gov.uk/planning/spatial_planning/cheshire_east_local_plan/local_plan_strategy.aspx

Committed development

2.1.20 Committed developments are defined as developments with planning permission or sites allocated in adopted development plans. Committed developments have not been considered in the assessment for the working draft EIA Report. Those within, or close to, the land required for the Proposed Scheme will be taken into account in the assessment described in the formal EIA Report.

2.2 Description of the Proposed Scheme

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

2.2.2 Land required permanently for the Proposed Scheme is described in this section and is shown on Map Series CT-06. Land would also be required on a temporary basis for construction. This is set out in Section 2.3 and is shown on Map Series CT-05.

2.2.3 In general, features are described from south to north along the route (and east to west for features that cross the Proposed Scheme).

2.2.4 Design development continues on this section of route as further engineering and environmental baseline is collated, including field surveys, and as part of ongoing consultation and stakeholder engagement. Any further changes resulting from this will be reported in the formal EIA Report. The main areas of design development being considered include:

- refinement of the proposed Infrastructure Maintenance Depot (IMD) arrangements, including the potential to relocate the permanent maintenance facilities from the South Cheshire area to the Stone and Swynnerton area (CA3) on the site of the temporary railhead near Stone, see paragraph 2.5.13 to 2.5.16 for further details;
- refinement of connections to the WCML and conventional railway;
- review of the proposed lengths and heights of viaducts and other river crossing structures and associated replacement floodplain storage areas, following hydraulic modelling[13];
- temporary and permanent utility diversions;
- refinement of the realignment of roads and PRoW crossing the Proposed Scheme;
- refinement of drainage features required for rail and highways;

[13] The design of viaducts is currently based on flood risk data received from third parties. The effects of any viaducts, bridges, embankments or other structures that intrude into floodplains would be assessed in detail and included in the final design and formal EIA Report.

- refinement of maintenance access routes and access to balancing ponds;
- additional environmental features required to mitigate likely significant environmental effects;
- accommodation works and crossings of the route for private means of access;
- refinement of construction compound and haul road locations;
- refinement of auto-transformer station and auto-transformer feeder station locations; and
- refinement of power supply and grid connections.

2.2.5 The power supply required to operate the Proposed Scheme would come from the national distribution network and connect to the Proposed Scheme via an auto-transformer feeder station. Connections from the distribution network to the auto-transformer feeder station would require new transmission lines, which would either be buried or overhead lines, or a combination of both. In the South Cheshire area, an auto-transformer feeder station is proposed to the south of Newcastle Road. It is currently anticipated that the transmission lines to connect to the distribution network could extend for up to 18km between the network and the auto-transformer feeder station. Further studies to consider the route and design of these transmission lines are ongoing, informed by continued engagement with the statutory provider, and will be reported in the formal EIA Report.

2.2.6 The B5071 Jack Mills Way was opened on 27 July 2015 and provides local and strategic links to Crewe and Nantwich as well as the A500 Shavington Bypass and the M6. The road eases traffic on the existing roads in the local area to the west and offers relief to other routes into Crewe. The B5071 Jack Mills Way additionally provides access to the Basford West development site on which a mixed used development is to be located, part of which is currently under construction.

2.2.7 In parallel to considering a potential alternative location for the permanent maintenance facilities, HS2 Ltd will continue to work with CEC to maintain the improvements provided by the B5071 Jack Mills Way, which could include either realigning the B5071 Jack Mills Way or reconfiguring the HS2 Crewe IMD such that the existing road is retained. Changes to the design will be reported in the formal EIA Report.

2.2.8 A series of six balancing ponds are currently located along the eastern side of the B5071 Jack Mills Way/Crewe Road between the A500 Shavington Bypass and Gresty Brook. These collect surface water runoff from this length of the B5071 Jack Mills Way/Crewe Road and the Basford West mixed use development site that is currently being constructed in stages with plots located on both sides of the road. Four of the six ponds would be lost as a result of the HS2 Crewe IMD. The remaining two ponds would be incorporated into the design and would continue to collect surface water from certain sections of road and parts of the development area. An additional balancing pond is to be provided, located to the south of the HS2 Crewe IMD, which would collect surface water runoff from the HS2 Crewe IMD itself. In parallel to considering a potential alternative location for the permanent maintenance facilities, HS2 Ltd will continue to work with CEC and is undertaking a further study to

determine the need for additional balancing pond(s) to collect water from other parts of the development area and the remaining sections of road. Any changes to the design will be reported in the formal EIA Report.

Overview

2.2.9 The Proposed Scheme through the South Cheshire area would be approximately 8km in length. The route of the Proposed Scheme, referred to in this report as the HS2 main line, would extend from the boundary with the Whitmore Heath to Madeley area (CA4), south-west of Wrinehill, and travel north towards Crewe. The Proposed Scheme would end to the south of Crewe in a retained cutting (which would connect into a tunnel portal and a tunnel (part of the proposed HS2 Phase 2b)).

2.2.10 The route of the Proposed Scheme would connect to the WCML via two spurs: a spur that connects to the WCML northbound towards Crewe, referred to as the HS2 spur (northbound), and a spur that connects to the WCML southbound towards London, referred to as the HS2 spur (southbound).

2.2.11 Modifications to the WCML would be required to enable the route of the Proposed Scheme to connect to the existing railway infrastructure. This would include construction of a new section of track and realignment of a section of the WCML and associated railway modifications including relocation of Network Rail assets, overhead line equipment, signalling and traction power works. The new section would be built offline and connected to the WCML on completion.

2.2.12 An IMD, the HS2 Crewe IMD, would be located at the northern end of the South Cheshire area, adjacent to the Network Rail sidings at Basford Hall and 6km west of junction 16 of the M6.

2.2.13 This section of the route is illustrated on Map Series CT-06 within the Volume 2, CA5 Map Book.

Summary of the sections

2.2.14 The description of the Proposed Scheme within the South Cheshire area has four main components:

- HS2 main line: the route of the Proposed Scheme, continuing from the adjacent Whitmore Heath to Madeley (CA4) area to the boundary with the proposed Phase 2b scheme, south of Crewe;
- HS2 spurs: these spurs would connect the HS2 main line to the existing WCML infrastructure. An HS2 spur (southbound) would connect to the WCML towards London and an HS2 spur (northbound) would connect to the WCML towards Crewe;
- modifications to the WCML: these would include realignment of a section of the existing WCML and construction of a new section of track to facilitate the HS2 spurs connection to the WCML; and
- HS2 Crewe IMD: this would provide permanent maintenance facilities for the Proposed Scheme, connecting to the HS2 main line and WCML, and with

dedicated reception tracks to enable trains to enter the HS2 Crewe IMD from both the south and north.

2.2.15 Each of these components and the key features and works are set out in the following sections. Where key features are associated with more than one component of the Proposed Scheme, they are described within the section they are first associated with. Where reference is made to the Proposed Scheme, this includes the four sections collectively.

HS2 main line

2.2.16 The HS2 main line is described in four geographical sections, from south to north:

- Checkley Brook to the Den Lane realignment;
- Den Lane realignment to Blakenhall Bridleway 12 West accommodation underbridge;
- Blakenhall Bridleway 12 West accommodation underbridge to Chorlton Footpath 7 overbridge; and
- Chorlton Footpath 7 overbridge to the north end of the HS2 main line.

Checkley Brook to Den Lane realignment

2.2.17 The route of the Proposed Scheme would enter the South Cheshire area south of Checkley Brook viaduct and continue along Checkley North embankment before passing into Blakenhall cutting (South). The route would pass under Checkley Lane overbridge and continue towards the realigned Den Lane (West) and Den Lane Central underbridge.

2.2.18 Key features of this approximately 2.3km section are shown on maps CT-06-235 and CT-06-236 and would include:

- three balancing ponds for railway drainage located to the west of the HS2 main line; one located south of the River Lea; one located north of River Lea; and one adjacent to Grange Farm;
- Checkley Brook viaduct, approximately 160m in length and up to 14m in height across Checkley Brook and the River Lea;
- realignment of Checkley cum Wrinehill Footpath 4 by approximately 250m to the south-east side of its existing alignment;
- Checkley North embankment, approximately 345m in length and up to 9m in height;
- realignment of Checkley cum Wrinehill Footpath 8 by approximately 275m to the south-east of its existing alignment;
- an area of grassland habitat creation to the west of the HS2 main line adjacent to Checkley North embankment;

- Randilow South drop inlet culvert[14], crossing under Checkley North embankment in a general east to west direction;
- Wrinehill auto-transformer station, with access from the north via the realigned Checkley Lane;
- Blakenhall cutting (South), approximately 1.1km in length, up to 30m in width and up to 14m in depth;
- realignment of Checkley cum Wrinehill Footpath 5 for approximately 325m to the eastern side of the HS2 main line, joining the realigned Checkley Lane;
- areas of landscape mitigation planting to the east and west of the HS2 main line along Blakenhall cutting (South);
- five ecological mitigation ponds; one located to the western side of the HS2 main line, south of the realigned Checkley Lane; two located to the east of the Blakenhall cutting (North); and two located to the west of Blakenhall cutting (North);
- realignment of Checkley Lane to the south of its existing alignment;
- Checkley Lane overbridge, approximately 90m in length, rejoining the current Checkley Lane alignment to the south of Randilow Farmhouse;
- accommodation access for Grange Farm, with access from the realigned Checkley Lane;
- a balancing pond for railway drainage to the west of the HS2 main line, with access from the realigned Checkley Lane;
- Randilow North drop inlet culvert passing under the HS2 main line in an east to west direction;
- Blakenhall cutting (North), approximately 750m in length, 100m in width and up to 18m in depth;
- Blakenhall retaining wall 1, approximately 1.1km in length with a height of up to 6m above ground level to accommodate the level difference between the HS2 main line and the HS2 spur (southbound);
- permanent closure of Blakenhall Footpath 15 and Blakenhall Footpath 17, with users diverted via the realigned Checkley Lane;
- Blakenhall South inverted siphon[15] for realignment of an unnamed watercourse, passing under the HS2 main line at Blakenhall cutting (North) in a south-west to north-east direction and joining the Blakenhall Spur culvert;

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

[15] A form of culvert used on level ground where the water level has to be lowered to pass under the route, other railway or a road access; constructed using enclosed chambers on both sides of the route.

- Blakenhall drop inlet culvert for diversion of an unnamed watercourse, passing under the HS2 main line in a north-west to south-east direction; and
- Den Lane Central underbridge, approximately 15m in length passing under the route of the HS2 main line and between two viaducts carrying the HS2 spurs, described in the following sections.

2.2.19 There would be maintenance access routes and hedgerow planting throughout this section.

2.2.20 Construction of this section would be managed from Checkley Brook viaduct satellite compound in the Whitmore Heath to Madeley area (CA4), Checkley Lane east satellite compound and Den Lane viaduct satellite compound, which are described in Section 2.3, and shown on maps CT-05-235 and CT-05-236.

Den Lane realignment to Blakenhall Bridleway 12 West accommodation underbridge

2.2.21 The route of the Proposed Scheme would continue in a shallow cutting from the realigned Den Lane and flanked by Blakenhall South embankment on both sides, which would carry the HS2 spurs (described later in this section). The HS2 main line would pass under the Blakenhall viaduct, which would carry the HS2 spur (southbound), before continuing to Blakenhall Bridleway 12 West accommodation overbridge.

2.2.22 Key features of this approximately 1.5km section are shown on maps CT-06-236 and CT-06-237 and would include:

- continuation of the HS2 main line for approximately 1.5km, through shallow cutting and between Blakenhall South embankment on both sides;
- realignment of Blakenhall Footpath 9 by approximately 200m to the north of its existing alignment and joining the realigned Den Lane (West) to the west of the HS2 main line;
- an area of grassland habitat creation to the west of the HS2 main line, north of Den Lane West realignment;
- Blakenhall retaining wall 2, approximately 700m in length with a height up to 6m, located on the eastern side of the HS2 main line, between Den Lane Central underbridge and Blakenhall viaduct;
- realignment of Den Lane to the south-west of its existing alignment, to be referred to as Den Lane (West) and rejoining at the junction with Mill Lane, to the west of the HS2 main line;
- Blakenhall retaining wall 3, approximately 220m in length with a height of up to 14m between the western side of the HS2 main line and the HS2 spur (southbound);
- one ecological mitigation pond to the west of the HS2 main line, adjacent to Den Lane;

- Gonsley drop inlet culvert, for realignment of an unnamed watercourse, passing under the HS2 main line in an east to west direction;
- a balancing pond for railway drainage to the east of the HS2 main line with access from Blakenhall Bridleway 8;
- areas of landscape mitigation planting to the east and west of the HS2 main line;
- realignment of Blakenhall Bridleway 12 for approximately 550m to the west of its existing alignment, and crossing the HS2 main line via the Blakenhall Bridleway 12 West accommodation overbridge;
- Blakenhall Bridleway 12 West accommodation overbridge, approximately 55m in length, crossing over the HS2 main line and the HS2 Crewe IMD reception tracks and rejoining the Blakenhall Bridleway 12 to the east of the new section of the WCML; and
- Blakenhall retaining wall 4, approximately 110m in length with a height of up to 7m between the eastern side of the HS2 main line and the HS2 spur (southbound), continuing north from Blakenhall viaduct. There would be maintenance access routes and hedgerow planting throughout this section.

2.2.23 Construction of this section would be managed from the Den Lane east satellite compound and the Blakenhall north embankment satellite compound, which are described in Section 2.3, and shown on maps CT-05-236 and CT-06-237.

Blakenhall Bridleway 12 West accommodation overbridge to Chorlton Footpath 7 overbridge

2.2.24 The HS2 main line would continue from Blakenhall Bridleway 12 West accommodation overbridge. It would run in parallel to the realigned WCML, with the HS2 spurs to the eastern side and the approach to the HS2 Crewe IMD to the west. The HS2 main line would continue from Chorlton viaduct to Chorlton embankment and descend into the Crewe south retained cut.

2.2.25 Key features of this approximately 2km section are shown on maps CT-06-237 and CT-06-238 and would include:

- section of the HS2 main line, approximately 1.3km in length;
- Half Moon inverted siphon for realignment of a tributary of Swill Brook, passing under the HS2 main line in a west to east direction;
- a noise barrier up approximately 530m in length between the HS2 main line and WCML;
- Chorlton retaining wall 1, approximately 230m in length and up to 3m in height between the HS2 main line and Blakenhall North embankment, which would carry the HS2 spurs;
- three balancing ponds for railway drainage; two located to the west of the HS2 main line, north of the realigned Blakenhall Bridleway 12, and one located to the east of the HS2 main line, adjacent to the realigned WCML;

- areas of landscape mitigation planting to the west and east of HS2 main line along this section;
- diversion of Blakenhall Footpath 11 to the south of its existing alignment, joining the realigned Blakenhall Bridleway 12;
- Chorlton retaining wall 4, approximately 320m in length and a up to 4m in height above ground level;
- permanent closure of Chorlton Lane on the eastern side of the HS2 main line and diversion of Chorlton Lane on the western side of the HS2 main line, approximately 1.5km to the north and joining the Newcastle Road to the west of the South Crewe auto-transformer feeder station;
- eight ecological mitigation ponds; five located on the eastern side of the HS2 main line, near Chorlton village, and three to the western side of the HS2 main line, along the diverted Chorlton Lane;
- a section of Crewe south retained cut, approximately 650m in length and up to approximately 20m in depth;
- two pumping stations to the west of Crewe south retained cut, with access from the diverted Chorlton Lane;
- two balancing ponds for railway drainage to the western side of the HS2 main line, with access from the diverted Chorlton Lane; and
- an area of grassland habitat creation to the western side of the HS2 main line, adjacent to the HS2 Crewe IMD, described in the IMD sections below.

2.2.26 There would be maintenance access routes and hedgerow planting throughout this section.

2.2.27 Construction of this section would be managed from the Blakenhall north embankment satellite compound and South Crewe ATFS main compound which are described in Section 2.3, and shown on maps CT-05-237 and CT-05-238.

Chorlton Footpath 7 overbridge to the north end of the HS2 main line

2.2.28 The HS2 main line would continue in the Crewe south retained cut before reaching the end of the South Cheshire area at the boundary with Phase 2b, approximately 150m south of the realigned A500 Shavington Bypass. In this section the HS2 main line would be at ground level for approximately 150m.

2.2.29 Key features of this approximately 1.1km section are shown on maps CT-06-238 and CT-06-239 and would include:

- continuation of the Crewe south retained cut, approximately 950m in length and up to 20m in depth;
- South Crewe auto-transformer feeder station to the west of the HS2 main line with access from Newcastle Road;

- diversion of Basford Footpath 5 by approximately 250m to the south of its existing alignment, joining the realigned Newcastle Road, described in the following sections;
- two balancing ponds for railway drainage; one located to the west of the HS2 main line with access from Casey Lane from the south, and one located to the east of the HS2 main line with access from the realigned Casey Lane to the north; and
- one ecological mitigation pond to the west of the HS2 main line, adjacent to the realigned Newcastle Road.

2.2.30 There would be maintenance access routes and hedgerow planting throughout this section.

2.2.31 Construction of this section would be managed from the South Crewe ATFS main compound, which is described in Section 2.3, and shown on map CT-05-238.

HS2 spurs

2.2.32 The HS2 main line would connect to the WCML via two spurs: one spur would connect to the WCML towards Crewe, referred to as the HS2 spur (northbound), and one would connect to the WCML towards London, referred to as the HS2 spur (southbound).

2.2.33 The HS2 spurs would diverge from the HS2 main line at the point where the route passes into Blakenhall cutting (South). The HS2 spur (southbound) would run along the eastern side of the HS2 main line and the HS2 spur (northbound) would run along the western side. The two spurs would then converge on the eastern side of the HS2 main line, approximately 250m north of Blakenhall viaduct. The HS2 spurs would continue together for approximately 3.5km before joining the WCML approximately 150m south of Newcastle Road.

2.2.34 Key features of this 5.8km section would include:

- Blakenhall spur culvert for realignment of an unnamed watercourse, along Blakenhall cutting (North) in a general west to east direction, shown on map CT-06-236;
- Blakenhall South embankment carrying the HS2 spurs on each side of the HS2 main line, approximately 450m in length and up to 15m in height, shown on map CT-06-236;
- Den Lane East viaduct, approximately 70m in length and up to 8m in height to carry the HS2 spur (southbound) over Den Lane, shown on map CT-06-236;
- Den Lane West viaduct, approximately 70m in length and up to 8m in height to carry the HS2 spur (northbound) over Den Lane, shown on map CT-06-236;
- a noise barrier up approximately 500m in length along Blakenhall South embankment, shown on map CT-06-236;

- Blakenhall viaduct, approximately 290m in length and up to 14m in height to carry the HS2 spur (northbound) over the HS2 main line, joining the HS2 spur (southbound) on Blakenhall North embankment, shown on map CT-06-237;
- Blakenhall North embankment carrying both the HS2 spur (northbound) and HS2 spur (southbound) to the east of the HS2 main line, approximately 800m in length and up to 16m in height, shown on map CT-06-237;
- Blakenhall Bridleway 12 Central accommodation underbridge, approximately 11m in length, to provide farm and bridleway access, shown on map CT-06-237;
- Chorlton viaduct, approximately 330m in length and up to 10m in height to carry the HS2 spurs over the realigned WCML, shown on map CT-06-238; and
- diversion of Chorlton Footpath 13 to the north of its existing alignment, joining Chorlton Footpath 9, shown on map CT-06-238.

2.2.35 Construction of this section would be managed from the Checkley Lane East satellite compound, Checkley Lane West satellite compound, Den Lane viaduct satellite compound, Blakenhall North embankment satellite compound and South Crewe ATFS main compound, which are described in Section 2.3, and shown on maps CT-05-235 to CT-05-238.

Modifications to the WCML in this area

2.2.36 To facilitate the HS2 main line and HS2 spurs connection to the WCML, modifications would be required to the existing infrastructure in this area. The following three components would be required:

- realignment of the southern part of the WCML within the South Cheshire area, starting approximately 700m north-west of Checkley Lane and extending to the replacement Blakenhall Bridleway 8 accommodation overbridge. This would realign a section of the WCML to the west of its existing alignment to facilitate connection to the HS2 spurs;
- a new section of WCML, approximately 4.2km in length, starting from the replacement Blakenhall Bridleway 8 overbridge and continuing to the existing Casey Lane. This new section would connect the realigned WCML with the existing WCML, to the east of the HS2 spurs; and
- connection of the new section of the WCML to the HS2 spurs at the existing Casey Lane, in the northern part of the South Cheshire area.

Realignment of the southern part of WCML

2.2.37 The realignment of the southern part of the WCML would start approximately 700m north of where the existing WCML crosses Checkley Lane, passing through Blakenhall South-east cutting. The realigned section of the WCML would end at the replacement Blakenhall Bridleway 8 accommodation overbridge, where the existing bridge would be replaced to facilitate the new WCML alignment.

2.2.38 Key features of this approximately 1.8km section are shown on Map CT-06-236 and would include:

- Blakenhall South-east cutting, approximately 1.1km in length and up to 8m in depth;
- WCML Den Lane culvert, extending an existing culvert along the Blakenhall South-east cutting in an east to west direction;
- realignment of Den Lane, approximately 50m to the east of its existing alignment, which would be referred to as Den Lane (East);
- realignment of Blakenhall Footpath 13 by approximately 25m to the east of its existing alignment to join Den Lane (East);
- access to WCML railway system signalling equipment from Den Lane (East) and relocation of existing railway systems equipment at Den Lane (East);
- replacement Den Lane (WCML) overbridge, approximately 55m in length, to carry Den Lane (East) over the existing and realigned sections of the WCML;
- an area of woodland habitat creation between the WCML and Den Lane (East); and
- replacement Blakenhall Bridleway 8 accommodation overbridge, approximately 55m in length, for farm access over the existing and realigned sections of the WCML.

2.2.39 Construction of this section would be managed from the Den Lane east satellite compound, which is described in Section 2.3, and shown on Map CT-05-236.

New section of WCML

2.2.40 A new section of the WCML would be constructed to connect the realigned southern section of the WCML with the existing alignment. This new section would extend for approximately 4km, starting from the replacement Blakenhall Bridleway 8 accommodation overbridge and continuing in Blakenhall North-east cutting to the existing Casey Lane. One of the existing WCML tracks would be realigned, serving as a slow line connection into Crewe and providing a route to Chester, Shrewsbury and South Wales. The realigned track would rejoin the existing WCML alignment to the south of Basford Hall, south of Crewe. Two new siding tracks would be constructed offline and run adjacent to and parallel to the new section of WCML and into the existing freight facilities at the sidings at Basford Hall.

2.2.41 Key features of this approximately 2.4km section are shown on maps CT-06-237, CT-06-238 and CT-06-239 and would include:

- two new siding tracks, approximately 2.5km in length (of an overall length of 6km);
- Blakenhall North-east cutting, approximately 540m in length and up to 6m in depth;

- areas of landscape mitigation planting to the east and west of the existing WCML;
- an area of grassland habitat creation to the west of the existing WCML;
- WCML Betley South culvert along the Blakenhall South-east cutting in a general east to west direction;
- WCML Betley North culvert along the Blakenhall South-east cutting in a general east to west direction;
- diversion of Blakenhall Footpath 7 by approximately 275m to the north of its existing alignment;
- an area for Network Rail track equipment;
- a balancing pond for railway drainage to the western side of the existing WCML;
- Blakenhall Bridleway 12 East accommodation overbridge, approximately 20m in length, to provide farm access and carry the bridleway over the WCML;
- Chorlton retaining wall 2, approximately 150m in length and up to 16m in height, accommodating the level difference between the HS2 spurs and the WCML;
- Chorlton retaining wall 3, approximately 460m in length and up to 11m in height, accommodating the level difference between the HS2 spurs and the WCML;
- extension of Chorlton Lane on the eastern side of the existing WCML by approximately 75m east of its existing alignment to join the realigned Newcastle Road;
- permanent realignment of Newcastle Road approximately 250m to the north of its existing alignment, crossing the HS2 main line, new section of the WCML and IMD reception tracks via Newcastle Road overbridge;
- realignment of Basford Footpath 6 approximately 15m to the east of its existing alignment;
- permanent closure of Basford Footpath 17, with users diverted via the realigned Newcastle Road;
- Newcastle Road overbridge, approximately 275m in length and up to 12m in height;
- realignment of Basford Footpath 4, with users diverted via the realigned Casey Lane
- permanent realignment of Basford Footpath 3, with users diverted via the realigned Casey Lane;
- permanent closure of Casey Lane to the east of the existing WCML alignment and at the north junction with the existing Weston Lane;

- permanent realignment of Casey Lane to the south of its existing alignment to join the realigned Weston Lane; and
- a balancing pond for railway drainage to the eastern side of the existing WCML, with access from the realigned Casey Lane.

2.2.42 Construction of this section would be managed from the Blakenhall north embankment satellite compound, Delta Junction satellite compound, South Crewe ATFS main compound, Newcastle Road satellite compound, and A500 east satellite compound, which are described in Section 2.3, and shown on maps CT-05-237, CT-05-238 and CT-05-239.

Connection of the new section of WCML to the HS2 spurs

2.2.43 The HS2 spurs connection with the WCML would start at the existing Casey Lane, running along shallow cuttings and connecting into the WCML approximately 40m north of the existing A500 Shavington Bypass. The existing WCML connections to Basford Hall would be modified.

2.2.44 Key features of this approximately 1.5km section are shown on maps CT-06-239, CT-06-239L and CT-06-239R and would include:

- two new siding tracks, approximately 1.5km in length (of an overall length of 6km);
- permanent realignment of Weston Lane to the south of its existing alignment via the Weston Lane overbridge and permanent closure of the existing Weston Lane to the west of the Proposed Scheme;
- Weston Lane overbridge, approximately 245m in length and up to 10m in height, crossing the IMD access spurs and reception tracks;
- extension of Larch Avenue to the west of the IMD access spurs and reception tracks to join the realigned Weston Lane;

2.2.45 Construction of this section would be managed from the Casey Lane satellite compound and Basford satellite compound, which are described in Section 2.3, and shown on Map CT-05-239.

HS2 Crewe IMD

2.2.46 The HS2 Crewe IMD would be located at the northern end of the South Cheshire area, on an area of approximately 37ha to the west of the HS2 main line. The HS2 Crewe IMD would operate as a base for maintenance activities to support the HS2 railway infrastructure. The HS2 Crewe IMD would also connect to existing railway infrastructure.

2.2.47 The permanent maintenance facilities for the Proposed Scheme would comprise of two parts:

- HS2 Crewe IMD; and
- the IMD access spurs and reception tracks from the HS2 main line and the connection to the WCML.

2.2.48 These are described in the following sections.

HS2 Crewe IMD

2.2.49 The HS2 Crewe IMD is shown on maps CT-06-239 to CT-06-240. The facilities which would comprise the HS2 Crewe IMD include:

- a depot building to store and maintain maintenance vehicles, up to approximately 13m in height and with a covered roof area of approximately 6,300m²;
- a single-storey covered storage and light maintenance workshop area of approximately 5,000m²;
- a two-storey office building approximately 25m x 75m, with parking for up to 300 staff, and an outdoor training compound approximately 170m x 60m;
- a single-storey main workshop building of approximately 105m x 25m;
- a sidings for handling and storage of railway infrastructure replacement materials and maintenance trains;
- open storage and laydown areas;
- a two-storey car park for IMD staff; and
- a single-storey ancillary building.

2.2.50 The key features and works associated with the HS2 Crewe IMD are shown on maps CT-06-239 to CT-06-240 and would include:

- two new siding tracks, approximately 2km in length (of an overall length of 6km);
- replacement of the existing Shavington Bypass viaduct and approach embankments for the construction of the IMD access spurs to the HS2 Crewe IMD;
- works to the B5071 Jack Mills Way to allow HGV access to the HS2 Crewe IMD;
- two ecological mitigation ponds to the south of the HS2 Crewe IMD;
- a balancing pond for railway drainage to the south-west of the HS2 Crewe IMD, with access from the B5071 Jack Mills Way;
- permanent realignment of the Crewe Road to the west of its existing alignment;
- staff access to the HS2 Crewe IMD from the realigned Crewe Road;
- Crewe IMD retaining wall 4 on the east side of the HS2 Crewe IMD, approximately 75m in length and up to 6m in height;
- an area of grassland habitat creation on the western side of the IMD reception tracks;

- Basford West culvert for diversion of an unnamed watercourse; and
- an area of landscape mitigation planting to the southern perimeter of the HS2 Crewe IMD.

HS2 Crewe IMD access

2.2.51 Access spurs to the HS2 Crewe IMD from the HS2 main line would extend from the north of the Den Lane Central underbridge and Den Lane East and West viaducts and continue northwards for approximately 4.7km, where they would enter the HS2 Crewe IMD.

2.2.52 An access spur to the HS2 Crewe IMD from the WCML would connect at the northern end of the South Cheshire area, approximately 150m to the north of the realigned A500 Shavington Bypass.

2.2.53 Reception tracks for the HS2 Crewe IMD would be located at the southern end of the HS2 main line access spur and be approximately 800m in length. These would enable trains to enter the HS2 Crewe IMD from both the south and north, serving the following three key purposes during the operation of the Proposed Scheme:

- an area for trains to reverse into prior to entering the HS2 Crewe IMD;
- an area for stabling maintenance trains; and
- an area for temporary stabling of any passenger trains prior to their movement to another location.

2.2.54 Key works associated with the HS2 Crewe IMD access would include:

- HS2 Crewe IMD access spurs and reception tracks, running parallel to the west of the HS2 main line, approximately 4.7km in length, shown on maps CT-06-237 to CT-06-239;
- Crewe IMD retaining wall 1, approximately 160m in length and up to 4m in height between the HS2 main line and the eastern side of the HS2 Crewe IMD access spur to accommodate an access track for maintenance from the realigned Den Lane (West), shown on map CT-06-236;
- Crewe IMD retaining wall 2, approximately 70m in length and up to 7m in height between the HS2 main line and the eastern side of the HS2 Crewe IMD access spur, shown on map CT-06-236;
- Crewe IMD retaining wall 3, approximately 80m in length and up to 7m in height to accommodate the level difference between the HS2 Crewe IMD and Den Lane, shown on map CT-06-236;
- reception tracks, approximately 800m in length, located to the south of the Blakenhall Bridleway 12 East accommodation overbridge, shown on map CT-06-237;
- Blakenhall retaining wall 5, approximately 700m in length and up to 14m in height to accommodate the level difference between the IMD and Gonsley Green Farm, shown on map CT-06-237;

- permanent closure of a section of Chorlton Lane to the east of the HS2 spurs and permanent diversion of Chorlton Lane along the western side of the HS2 Crewe IMD access spur, shown on map CT-06-238;
- permanent realignment of Chorlton Footpath 8, approximately 50m west of its existing alignment to join the diverted Chorlton Lane, shown on map CT-06-238;
- permanent realignment of Chorlton Footpath 7, approximately 250m to the north of its existing alignment and crossing the HS2 main line, new section of the WCML, and IMD access spurs and reception tracks via the Chorlton Footpath 7 overbridge, shown on map CT-06-238;
- Chorlton Footpath 7 overbridge, approximately 210m in length, shown on map CT-06-238;
- permanent realignment of Basford Footpath 10, approximately 20m to the east of its existing alignment;
- permanent closure of Shavington cum Gresty Footpath 2, with users diverted to the realigned Crewe Road;
- permanent realignment of Basford Footpath 11, approximately 100m to the east of its existing alignment;
- permanent realignment of the A500 Shavington Bypass approximately 100m to the south of its existing alignment, shown on map CT-06-239;
- A500 Shavington Bypass overbridge, approximately 255m in length, to carry the A500 Shavington Bypass over the HS2 Crewe IMD, Basford Hall sidings and the WCML, shown on map CT-06-239;
- permanent realignment of Basford Footpath 1, approximately 200m to the east of its existing alignment;
- permanent realignment of Crotia Mill Lane via the Crotia Mill Lane overbridge, shown on map CT-06-239R; and
- Crotia Mill Lane overbridge, approximately 60m in length, crossing the realigned A500 Shavington Bypass, shown on map CT-06-239R.

2.2.55 Construction of this section would be managed from the Basford satellite compound, Swill Brook satellite compound, Heath Farm satellite compound, HS2 Crewe IMD satellite compound and Crewe satellite compound, which are described in Section 2.3, and shown on maps CT-05-239 and CT-05-240.

2.2.56 As part of the development of the design further work is being undertaken to consider the location and operating requirements of the permanent maintenance facilities. This includes the potential to relocate the permanent maintenance facilities from the South Cheshire area (CA5) to the Stone and Swynnerton area (CA3) on the site of the temporary railhead near Stone; see paragraph 2.5.13 to 2.5.16 for further details.

2.3 Construction of the Proposed Scheme

2.3.1 This section sets out the key construction activities that are envisaged to build the Proposed Scheme in the South Cheshire area. It includes:

- an overview of the construction process;
- a description of the advance works;
- a description of the engineering works to build the Proposed Scheme;
- information on construction waste and material resources;
- a description of how the Proposed Scheme would be commissioned; and
- an indicative construction programme.

2.3.2 The construction arrangements described in this section provide the basis for the assessment presented in this working draft EIA Report.

2.3.3 Land would be required permanently for the key features of the Proposed Scheme described in Section 2.2. Land would also be required temporarily for construction. Key temporary construction features are illustrated on the construction Map Series CT-05 (Volume 2, CA5 Map Book). Land required temporarily would be prepared for its eventual end use once the construction works in that area are complete. Such land would be returned to its pre-construction use, wherever appropriate, or to a condition as agreed with the owner of the land and the relevant planning authority.

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

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

Code of Construction Practice

2.3.6 All contractors would be required to comply with a Code of Construction Practice (CoCP). In addition, Local Environmental Management Plans (LEMPs) would be produced for each local authority area. The CoCP and LEMPs will be the means of controlling the construction works associated with the Proposed Scheme, with the objective of ensuring that the effects of the works on people and the natural environment are reduced as far as reasonably practicable. The CoCP will contain generic control measures and standards to be implemented throughout the construction process.

2.3.7 A draft CoCP has been prepared and is published alongside this document, as an appendix to Volume 1. It will remain under review as the design of the Proposed Scheme develops and further engagement with stakeholders is undertaken.

Overview of the construction process

2.3.8 Building and preparing the Proposed Scheme for operation would comprise the following general stages:

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

2.3.9 General information about the construction process is set out in more detail in Volume 1, Section 6, including:

- the approach to environmental management during construction and the role of the CoCP;
- working hours;
- management of construction traffic; and
- handling of construction materials.

Advance works

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

- further detailed site investigations and surveys for proposed construction compounds;
- further detailed environmental surveys;
- advance mitigation works including, where appropriate, contamination remediation, habitat creation and translocation, landscape planting and built heritage survey and investigation;
- site establishment with temporary fence construction; along with soil stripping and vegetation removal; and

- utility diversions and new utility connections for facilities associated with the Proposed Scheme.

Engineering works

Introduction

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

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

2.3.12 The installation of track in open areas would comprise the laying of ballast and/or slab tracks, rail and sleepers.

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

2.3.14 One main civil engineering compound would be located in the South Cheshire area, along with eight civil engineering satellite compounds. The main compound and four of the civil engineering satellite compounds would continue to be used as railway installation satellite compounds following the completion of civil engineering works at those compounds. There would be an additional six satellite compounds for railway systems installations.

2.3.15 Satellite compounds for railway systems works would be managed from the Stone railhead main compound in the Stone and Swynnerton area (CA3).

2.3.16 Figure 3 shows the management relationship for civil engineering works compounds and Figure 4 for the railway installation works. Details about individual compounds are provided in subsequent sections of this report.

General overview of construction compounds

2.3.17 The main compound would be used for core project management staff (i.e. engineering, planning and construction delivery) and commercial and administrative

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

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

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

2.3.19 The storage of soil, stripped as part of the works prior to it being used when the land is reinstated, requires land for the duration of construction. The location of soil storage areas would generally be adjacent to compounds and areas of construction activity.

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

Construction traffic routes and transfer nodes

2.3.21 The movement of construction vehicles to carry materials, plant, other equipment and workforce or moving empty, would take place both within the construction compounds, on public roads and between the compounds and working areas. Construction traffic would also utilise the existing rail network. The construction compounds would provide the interface between the construction works and the public road or rail network. The likely road routes to access compounds in the South Cheshire area are described in the subsequent sections of this report.

2.3.22 Where reasonably practicable, movements between the construction compounds and the work sites would be on designated haul roads within the site, often along the line of the route of the Proposed Scheme or running parallel to it.

2.3.23 Areas of land are also required for the storage, loading and unloading of bulk earthworks materials that are moved to and from the site on public highways. These areas are referred to as transfer nodes and are shown on maps CT-05-235 to CT-05-240 in the Volume 2, CA5 Map Book.

Figure 3: Construction compounds showing key indicative civil engineering works within the South Cheshire area

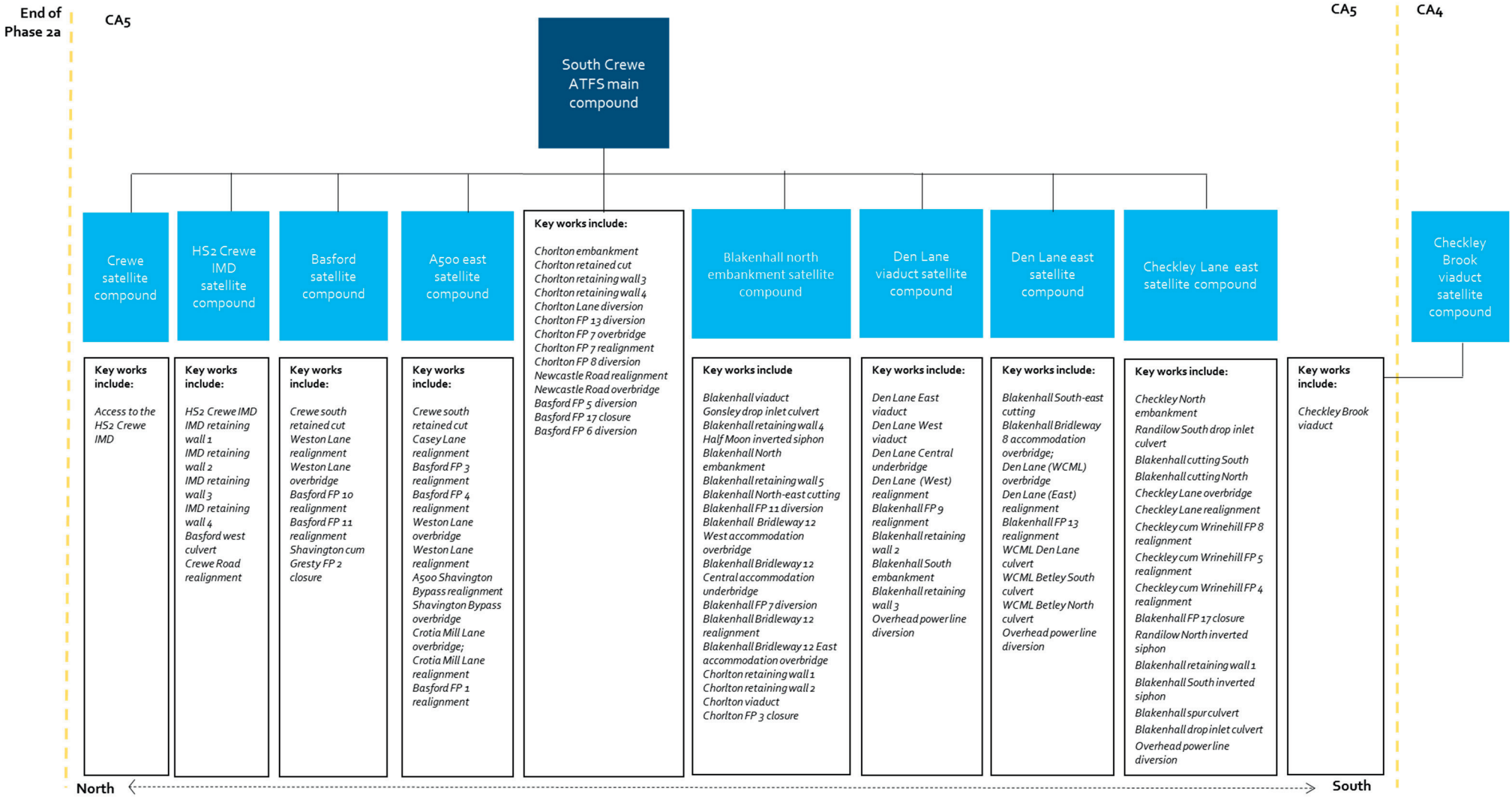
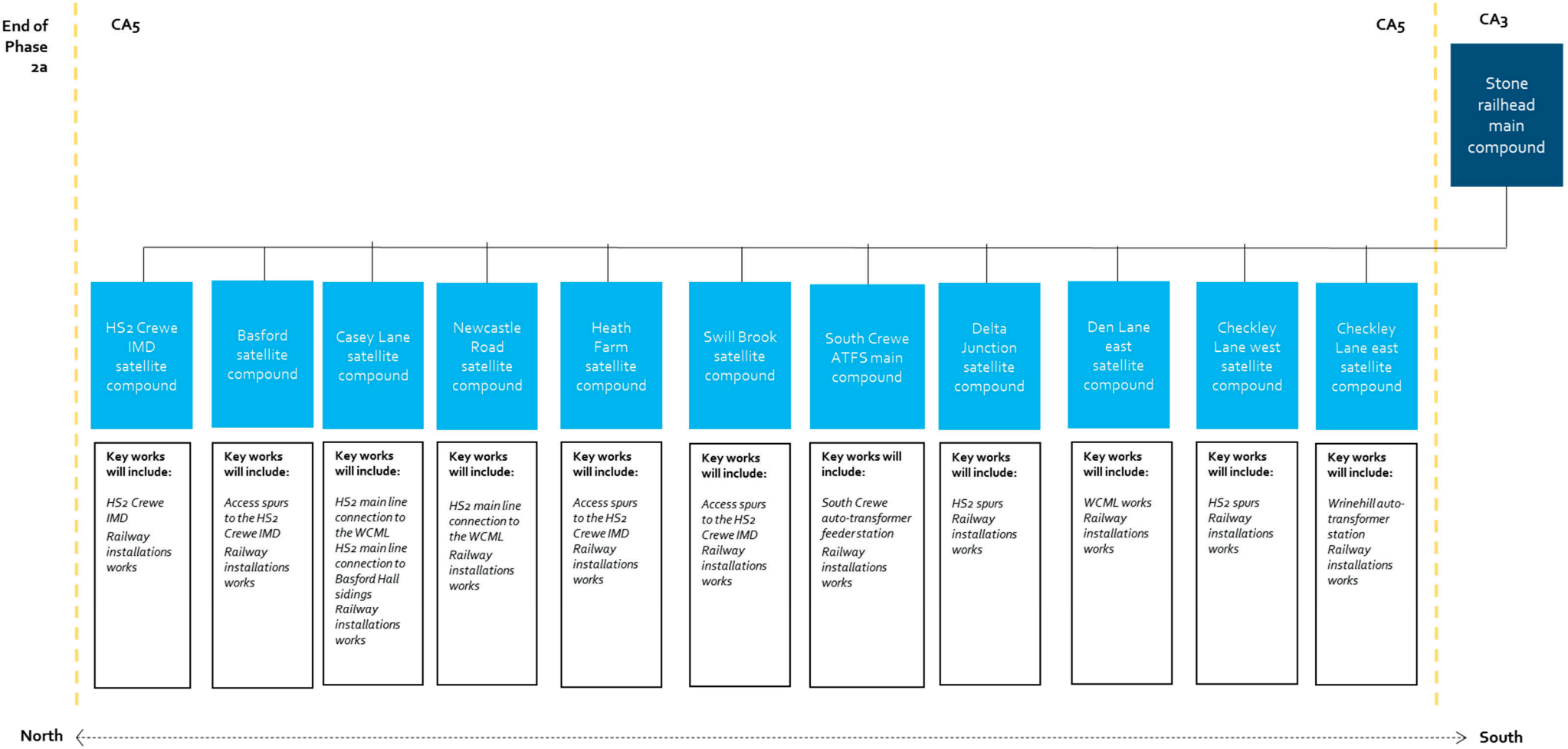


Figure 4: Construction compounds for railway installation works showing key indicative works within the South Cheshire area



Checkley Lane east satellite compound

2.3.24 This compound would provide for civil engineering and railway systems works and would:

- be operational for approximately six years and nine months commencing during 2020;
- support approximately 40 civil engineering workers per day (approximately 60 workers at peak times);
- support approximately 50 railway systems workers per day throughout much of the works period;
- be accessed via Checkley Lane from the east and west;
- be managed from South Crewe ATFS main compound for civil engineering works; and
- be managed from the Stone railhead main compound for railway systems works.

2.3.25 The compound would be used primarily to manage the construction of the following works:

- Checkley North embankment;
- Randilow South drop inlet culvert;
- Blakenhall cutting (South);
- Blakenhall cutting (North);
- Checkley Lane overbridge;
- realignment of Checkley Lane;
- realignment of Checkley cum Wrinehill Footpath 8;
- realignment of Checkley cum Wrinehill Footpath 5;
- realignment of Checkley cum Wrinehill Footpath 4;
- closure of Blakenhall Footpath 17;
- Randilow North inverted siphon;
- Blakenhall retaining wall 1;
- Blakenhall South inverted siphon;
- Blakenhall spur culvert;
- Blakenhall drop inlet culvert;
- permanent diversion of an overhead power line;
- Wrinehill auto-transformer station; and

- finalisation works including site reinstatement, landscaping and planting.

2.3.26 It is currently anticipated that no demolitions would be required as a result of the works to be managed from this compound.

2.3.27 Checkley Lane would be permanently realigned via the Checkley Lane overbridge with temporary lane closures for a period of approximately three months during the construction period.

2.3.28 A temporary realignment of Checkley cum Wrinehill Footpath 8 would be required during the construction period, diverting users approximately 250m to the south for a period of approximately three years. Once completed, the footpath would be permanently diverted under the Checkley Brook viaduct.

2.3.29 A temporary realignment of Checkley cum Wrinehill Footpath 5 would be required during the construction period, diverting users by approximately 300m east of its existing alignment for approximately three years. Once completed, it would be permanently realigned to the east of its existing alignment, joining the realigned Checkley Lane.

2.3.30 A temporary realignment of Checkley cum Wrinehill Footpath 4 would be required during the construction period, diverting users by approximately 400m north of its existing alignment for approximately three years. Once completed, it would be permanently realigned approximately 50m south of its existing alignment.

2.3.31 Blakenhall Footpath 17 would be permanently closed as a result of the works to be undertaken from this compound.

2.3.32 Two unnamed watercourses would be permanently realigned; one via Blakenhall spur culvert over Blakenhall cutting (North); and one via Blakenhall drop inlet culvert over Blakenhall cutting (North).

2.3.33 One overhead power line would be permanently diverted to raise the level of the conductors over the HS2 main line and HS2 spurs.

Checkley Lane west satellite compound

2.3.34 This compound would provide for railway systems works and would:

- be operational for approximately two years and 10 months commencing during 2024;
- support approximately 30 railway systems workers per day throughout much of the works period;
- be accessed via Checkley Lane; and
- be managed from the Stone railhead main compound.

2.3.35 The compound would be used primarily to manage the construction of the HS2 spurs.

2.3.36 It is currently anticipated that no demolitions would be required as a result of the works to be managed from this compound.

2.3.37 It is currently anticipated that no diversions of public roads, PRoW, watercourses or utilities would be required as a result of the works to be managed from this compound.

Den Lane east satellite compound

2.3.38 This compound would provide for civil engineering and railway systems works and would:

- be operational for approximately six years and nine months commencing during 2020;
- support approximately 20 civil engineering workers per day (approximately 25 workers at peak times);
- be operational for approximately 400 railway systems workers per day at peak times throughout much of the works period;
- be accessed via the realigned Den Lane (East);
- be managed from South Crewe ATFS main compound for civil engineering works; and
- be managed from the Stone railhead main compound for railway systems works.

2.3.39 The compound would be used primarily to manage the construction of the following works:

- Blakenhall South-east cutting;
- Blakenhall Bridleway 8 accommodation overbridge;
- Den Lane (WCML) overbridge;
- permanent realignment of Den Lane to become Den Lane (East);
- permanent realignment of Blakenhall Footpath 13;
- WCML Den Lane culvert;
- WCML Betley South culvert;
- WCML Betley North culvert;
- WCML works;
- permanent diversion of an overhead power line; and
- finalisation works including site reinstatement, landscaping and planting.

2.3.40 It is currently anticipated that demolition of the existing Bridleway 8 overbridge and Den Lane (WCML) overbridge would be required as a result of the works to be managed from this compound.

2.3.41 A permanent realignment of Den Lane, to create Den Lane (East), would be required, diverting vehicles 100m to the south-east of the existing alignment.

2.3.42 A temporary realignment of Blakenhall Footpath 13 would be required during the construction period, diverting users approximately 300m to the south for a period of approximately one year and six months. Following construction, the footpath would be permanently realigned 50m to the south to join the realigned Den Lane (East).

2.3.43 A temporary diversion of Blakenhall Bridleway 8 would be required by approximately 450m east of its existing alignment for approximately three years during the construction period.

2.3.44 It is currently anticipated that no diversions of watercourses would be required as a result of the works to be managed from this compound.

2.3.45 One overhead power line would be permanently diverted to raise the level of the conductors over the HS2 main line and HS2 spurs.

Den Lane viaduct satellite compound

2.3.46 This compound would provide for civil engineering works and would:

- be operational for approximately three years commencing from 2020;
- support approximately 45 civil engineering workers per day (approximately 70 workers at peak times) throughout much of the works period;
- be accessed via Mill Lane; and
- be managed from South Crewe ATFS main compound.

2.3.47 The compound would be used primarily to manage the construction of the following works:

- Den Lane East viaduct;
- Den Lane West viaduct;
- Den Lane Central underbridge;
- realignment of Den Lane to become Den Lane (West);
- realignment of Blakenhall Footpath 9;
- Blakenhall retaining wall 2;
- Blakenhall South embankment;
- Blakenhall retaining wall 3;
- permanent diversion of an overhead power line; and
- finalisation works including site reinstatement, landscaping and planting.

2.3.48 It is currently anticipated that no demolitions would be required as a result of the works to be managed from this compound.

2.3.49 A permanent realignment of Den Lane would be required, diverting users 200m to the south-east of its existing alignment, creating Den Lane (West).

2.3.50 A temporary realignment of Blakenhall Footpath 9 would be required during the construction period, diverting users approximately 400m to the north for a period of around one year and six months. On completion, the footpath would be realigned permanently 100m to the north, joining the realigned Den Lane (West).

2.3.51 It is currently anticipated that no diversions of watercourses would be required as a result of the works to be managed from this compound.

2.3.52 One overhead power line would be temporarily diverted so as to permanently raise the level of the existing power line over the HS2 main line and HS2 spurs.

Delta Junction satellite compound

2.3.53 This compound would provide for railway systems works and would:

- be operational for approximately three years and nine months commencing during 2023;
- support approximately 15 railway systems workers per day throughout much of the works period;
- be accessed via the site haul road to the west of the WCML from Den Lane (East); and
- be managed from the Stone railhead main compound.

2.3.54 The compound would be used primarily to manage the construction of the HS2 spurs.

2.3.55 It is currently anticipated that no demolitions would be required as a result of the works to be managed from this compound.

2.3.56 It is currently anticipated that no diversions of roads, PRoW, watercourses or utilities would be required as a result of the works to be managed from this compound.

Blakenhall north embankment satellite compound

2.3.57 This compound would provide for civil engineering works and would:

- be operational for approximately four years commencing during 2020;
- support approximately 55 civil engineering workers per day (approximately 80 workers at peak times) throughout much of the works period;
- be accessed via the site haul road to the west of the IMD spurs from Den Lane (West); and
- be managed from South Crewe ATFS main compound.

2.3.58 The compound would be used primarily to manage the construction of the following works:

- Blakenhall viaduct;
- Gonsley drop inlet culvert;
- Blakenhall retaining wall 4;

- Half Moon inverted siphon
- Blakenhall North embankment;
- Blakenhall retaining wall 5;
- Blakenhall North-east cutting;
- diversion of Blakenhall Footpath 11;
- Blakenhall Bridleway 12 West accommodation overbridge;
- Blakenhall Bridleway 12 Central accommodation underbridge;
- diversion of Blakenhall Footpath 7;
- realignment of Blakenhall Bridleway 12;
- Blakenhall Bridleway 12 East accommodation overbridge;
- Chorlton retaining wall 1;
- Chorlton retaining wall 2;
- Chorlton viaduct;
- closure of Chorlton Footpath 3; and
- finalisation works including site reinstatement, landscaping and planting.

2.3.59 It is currently anticipated that no demolitions would be required as a result of the works to be managed from this compound.

2.3.60 A temporary diversion of Blakenhall Footpath 7 would be required during the construction period, diverting users approximately 500m to the north for a period of approximately three years. Once completed, the footpath would be permanently diverted via the Blakenhall Bridleway 12 accommodation overbridge.

2.3.61 A temporary realignment of Blakenhall Bridleway 12 would be required during the construction period, diverting users approximately 450m to the south for a period of approximately one year and six months. Once completed, the bridleway would be permanently realigned via the Blakenhall Bridleway 12 accommodation overbridge.

2.3.62 A temporary diversion of Blakenhall Footpath 11 would be required during the construction period, diverting users approximately 150m to the west for a period of approximately one year and six months. On completion, it would be permanently diverted approximately 40m east of its existing alignment.

2.3.63 Chorlton Footpath 3 would be permanently closed as a result of the works to be managed from this compound with users diverted along Waybutt Lane to Blakenhall Bridleway 2.

2.3.64 A permanent realignment of an unnamed watercourse would be required, via the Gonsley drop inlet culvert, adjacent to the Blakenhall embankment.

2.3.65 It is currently anticipated that no diversions of public roads or utilities would be required as a result of the works to be undertaken from this compound.

South Crewe ATFS main compound

2.3.66 This compound would provide for civil engineering and railway systems works and would:

- be operational for approximately six years and nine months commencing during 2020;
- support approximately 200 civil engineering workers per day (approximately 300 workers at peak times);
- support approximately 75 railway systems workers throughout much of the works period;
- be accessed via the diverted Chorlton Lane from Newcastle Road; and
- be managed from the Stone railhead main compound for railway systems works.

2.3.67 The compound would be used primarily to manage the construction of the following works:

- Chorlton embankment;
- Crewe South retained cut;
- Chorlton retaining wall 3;
- Chorlton retaining wall 4;
- Chorlton Lane diversion;
- diversion of Chorlton Footpath 13;
- Chorlton Footpath 7 overbridge;
- realignment of Chorlton Footpath 7;
- realignment of Chorlton Footpath 8;
- Newcastle Road overbridge;
- realignment of Newcastle Road;
- diversion of Basford Footpath 5;
- closure of Basford Footpath 17;
- realignment of Basford Footpath 6;
- South Crewe auto-transformer feeder station; and
- finalisation works including site reinstatement, landscaping and planting.

2.3.68 It is currently anticipated that demolition of the following buildings and structures would be required as a result of the works to be managed from this compound:

- three residential cottages and one garage on Chorlton Lane;

- two commercial buildings on Newcastle Road;
- existing Newcastle Road overbridge;
- Chorlton Footpath 7 overbridge; and
- Casey Lane overbridge.

2.3.69 A permanent realignment of Newcastle Road would be required via the new Newcastle Road overbridge. During construction, temporary lane closures would be required for a period of approximately three months.

2.3.70 A temporary diversion of Chorlton Footpath 13 would be required during the construction period, diverting users approximately 200m to the south for a period of approximately one year and six months. Once completed, the footpath would be permanently diverted 50m to the east of its existing alignment.

2.3.71 A temporary realignment of Chorlton Footpath 7 would be required during the construction period, diverting users approximately 100m to the north for a period of approximately one year and six months. Once completed, the footpath would be permanently realigned via the Chorlton Footpath 7 overbridge.

2.3.72 A temporary realignment of Chorlton Footpath 8 would be required during the construction period, diverting users approximately 50m to the south for a period of approximately one year and six months. Once completed, the footpath would be permanently realigned to join the diverted Chorlton Lane.

2.3.73 A temporary diversion of Basford Footpath 5 would be required during the construction period, diverting users approximately 1.1km to the west for a period of up to one year and six months. Once completed, the footpath would be permanently diverted on to the realigned Newcastle Road.

2.3.74 Basford Footpath 17 would be permanently closed as a result of the works to be managed from this compound with users diverted along the realigned Newcastle Road.

2.3.75 A temporary realignment of Basford Footpath 6 would be required during the construction period, diverting users approximately 200m to the east for a period of up to three years. Once completed, the footpath would be permanently realigned approximately 15m to the east.

2.3.76 It is currently anticipated that no diversions of watercourses or utilities would be required as a result of the works to be managed from this compound.

Swill Brook satellite compound

2.3.77 This compound would provide for railway systems works and would:

- be operational for approximately three years commencing during 2024;
- support approximately 30 railway systems workers per day throughout much of the works period;
- be accessed via the site haul road to the west of the MD spurs from Den Lane (West); and

- be managed from the Stone railhead main compound for railway systems works.

2.3.78 The compound would be used primarily to manage the construction of the access spurs to the HS2 Crewe IMD.

2.3.79 It is currently anticipated that no demolitions would be required as a result of the works to be managed from this compound.

2.3.80 It is currently anticipated that no diversions of roads, PRoW, watercourses or utilities would be required as a result of the works to be managed from this compound.

Heath Farm satellite compound

2.3.81 This compound would provide for railway systems works and would:

- be operational for approximately three years commencing during 2024;
- support approximately 30 railway systems workers per day throughout much of the works period;
- be accessed via the realigned Chorlton Lane; and
- be managed from the Stone railhead main compound.

2.3.82 The compound would be used primarily to manage the construction of the access spurs to the HS2 Crewe IMD.

2.3.83 It is currently anticipated that no demolitions would be required as a result of the works to be managed from this compound.

2.3.84 It is currently anticipated that no diversions of roads, PRoW, watercourses or utilities would be required as a result of the works to be managed from this compound.

Newcastle Road satellite compound

2.3.85 This compound would provide for railway systems works and would:

- be operational for approximately four years commencing during 2020;
- support approximately 15 railway systems workers per day throughout much of the works period;
- be accessed via the existing Newcastle Road; and
- be managed from the Stone railhead main compound.

2.3.86 The compound would be used to manage the construction of the HS2 main line connection to the WCML.

2.3.87 It is currently anticipated that no demolitions would be required as a result of the works to be managed from this compound.

2.3.88 It is currently anticipated that no diversions of roads, PRoW, watercourses or utilities would be required as a result of the works to be managed from this compound.

Casey Lane satellite compound

2.3.89 This compound would provide for railway systems works and would:

- be operational for approximately four years commencing during 2023;
- support approximately 15 railway systems workers per day throughout much of the works period;
- be accessed via the realigned Casey Lane; and
- be managed from the Stone railhead main compound.

2.3.90 The compound would be used to manage the construction of the HS2 main line connection to the WCML and connection to the existing sidings at Basford Hall.

2.3.91 It is currently anticipated that no demolitions would be required as a result of the works to be managed from this compound.

2.3.92 It is currently anticipated that no diversions of roads, PRoW, watercourses or utilities would be required as a result of the works to be managed from this compound.

A500 east satellite compound

2.3.93 This compound would provide for civil engineering works and would:

- be operational for approximately four years and three months, commencing during 2020;
- support approximately 30 civil engineering workers per day (approximately 45 workers at peak times) throughout much of the works period;
- be accessed via the A500 Shavington Bypass; and
- be managed from South Crewe ATFS main compound.

2.3.94 The compound would be used to manage the construction of the following works:

- Crewe south retained cut;
- realignment of Casey Lane;
- realignment of Basford Footpath 4;
- realignment of Basford Footpath 3;
- Weston Lane overbridge;
- realignment of Weston Lane;
- realignment of A500 Shavington Bypass;
- A500 Shavington Bypass overbridge;
- Crotia Mill Lane overbridge;
- realignment of Crotia Mill Lane;
- realignment of Basford Footpath 1; and

- finalisation works including site reinstatement, landscaping and planting.

2.3.95 The demolition of the existing A500 Shavington Bypass overbridge would be required as a result of the works to be undertaken from this construction compound.

2.3.96 A permanent realignment of Casey Lane would be required connecting to the realigned Newcastle Road and Weston Lane.

2.3.97 A permanent realignment of Weston Lane would be required via the Weston Lane overbridge. During construction there would be temporary lane closures for a period of approximately three months.

2.3.98 A permanent realignment of the A500 Shavington Bypass would be required via the A500 Shavington Bypass overbridge. During construction there would be temporary lane closures for a period of approximately three months.

2.3.99 A permanent realignment of Crotia Mill Lane would be required, which would pass over the realigned A500 Shavington Bypass.

2.3.100 A temporary realignment of Basford Footpath 4 would be required during the construction period, diverting users approximately 300m to the south for a period of approximately one year and six months. Once completed, the footpath would be permanently diverted on to the realigned Casey Lane.

2.3.101 A temporary realignment of Basford Footpath 3 would be required during the construction period, diverting users on to the Basford Footpath 4 for a period of approximately one year and six months. Once completed, the footpath would be permanently realigned on to the realigned Casey Lane. A temporary realignment of Basford Footpath 1 would be required during the construction period, diverting users approximately 200m to the south for a period of up to three years. Once completed, the footpath would be permanently realigned to the west of the realigned A500 Shavington Bypass.

2.3.102 It is currently anticipated that no diversions of watercourses or utilities would be required as a result of the works to be managed from this compound.

Basford satellite compound

2.3.103 This compound would provide for civil engineering and railway systems works and would:

- be operational for approximately six years and nine months commencing during 2020;
- support approximately 30 civil engineering workers per day (approximately 45 workers at peak times);
- support approximately 15 railway systems workers per day throughout much of the works period;
- be accessed via the A500 Shavington Bypass and along the site haul road; and
- be managed from South Crewe ATFS main compound for civil engineering works; and

- be managed from the Stone railhead main compound for railway systems works.

2.3.104 The compound would be used primarily to manage the construction of the following works:

- Crewe south retained cut;
- realignment of Weston Lane;
- Weston Lane overbridge;
- realignment of Basford Footpath 10;
- realignment of Basford Footpath 11;
- closure of Shavington cum Gresty Footpath 2;
- access spurs to the HS2 Crewe IMD; and
- finalisation works including site reinstatement, landscaping and planting.

2.3.105 It is currently anticipated that demolition of one residential farmhouse, one commercial building and one outbuilding on Weston Lane would be required as a result of the works to be managed from this compound.

2.3.106 A permanent realignment of Weston Lane would be required via the Weston Lane overbridge. Temporary lane closures for traffic control would be required during the construction period for approximately three months.

2.3.107 A temporary realignment of Basford Footpath 10 would be required during the construction period, diverting users approximately 100m to the west of its existing alignment for approximately one year and six months. On completion, it would be permanently realigned approximately 20m to the east of its existing alignment.

2.3.108 A temporary realignment of Basford Footpath 11 would be required during the construction period, diverting users approximately 1.1km to the south for a period of up to three years. Once completed, the footpath would be permanently realigned to the east of the realigned A500 Shavington Bypass.

2.3.109 It is currently anticipated that no diversions of watercourses or utilities would be required as a result of the works to be managed from this compound.

HS2 Crewe IMD satellite compound

2.3.110 This compound would provide for civil engineering and railway systems works and would:

- be operational for approximately six years and nine months commencing during 2020;
- support approximately 40 civil engineering workers per day (approximately 60 workers at peak times) and 50 railway systems workers per day throughout much of the works period;
- be accessed via B5071 Jack Mills Way; and

- be managed from South Crewe ATFS main compound for civil engineering works and the Stone railhead main compound for railway systems works.

2.3.111 The compound would be used primarily to manage the construction of the following works:

- HS2 Crewe IMD;
- IMD retaining wall 1;
- IMD retaining wall 2;
- IMD retaining wall 3;
- IMD retaining wall 4;
- Basford west culvert;
- Crewe Road realignment; and
- finalisation works including site reinstatement, landscaping and planting.

2.3.112 It is currently anticipated that demolition of properties on the Basford West development site would be required as a result of the works to be managed from this compound. The Basford West site is currently under development and as of summer 2016 it is estimated that approximately 40 residential properties are either completed or under construction and would require demolition.

2.3.113 Permanent realignment of Crewe Road would be required. In addition, permanent closure of the B5071 Jack Mills Way, where it would cross the HS2 Crewe IMD, would be required. As referred to in Section 2.2, HS2 Ltd will continue to work with CEC to maintain the improvements provided by the B5071 Jack Mills Way, which could include either realigning the B5071 Jack Mills Way or reconfiguring the HS2 Crewe IMD such that the existing road is retained.

2.3.114 A permanent diversion of an unnamed watercourse via the Basford West culvert under the HS2 Crewe IMD would be required.

2.3.115 It is currently anticipated that no temporary or permanent diversions of utilities would be required as a result of the works to be managed from this compound.

Crewe satellite compound

2.3.116 This compound would provide for civil engineering works and would:

- be operational for approximately three years commencing during 2020;
- support approximately 40 civil engineering workers per day (approximately 60 workers at peak times) throughout much of the works period;
- be accessed from the A500 Shavington Bypass and along the site haul road; and
- be managed from South Crewe ATFS main compound.

2.3.117 The compound would be used primarily to manage the construction of the access to the HS2 Crewe IMD.

2.3.118 It is currently anticipated that no demolitions would be required as a result of the works to be managed from this compound.

2.3.119 It is currently anticipated that no diversions of public roads, PRoW, watercourses or utilities would be required as a result of the works to be managed from this compound.

Construction waste and material resources

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

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

Commissioning of the railway

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

Construction programme

2.3.123 A construction programme illustrating indicative periods for the construction activities described above is provided in Figure 5.

Figure 5: Indicative construction programme

Construction activity	2020 quarters				2021 quarters				2022 quarters				2023 quarters				2024 quarters				2025 quarters				2026 quarters				2027 quarters			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Preparatory and enabling works																																
Site compound set up, clearance, enabling works																																
Drainage and watercourse diversions																																
Road, footpath and utility diversions																																
Main construction works - Earthworks																																
Cuttings																																
Embankments																																
Mitigation earthworks																																
Main construction works - Structures																																
Retaining walls																																
Viaducts, underbridges and culverts																																
Overbridges and accommodation structures																																
Auto-transformer and sub-stations																																
Reinstatement, soft landscaping and finishes																																
Rail infrastructure fit-out																																
Track laying and overhhead line equipment - Classic Rail																																
Track laying and overhhead line equipment - HS2																																
Commissioning																																
Commissioning																																

Key	
	Construction activity that takes place at one or more locations for the majority of the quarter highlighted
	Construction activity that takes place at discrete locations for intermittent periods during the quarter highlighted

2.4 Operation of the Proposed Scheme

Operational specification

Introduction

2.4.1 Volume 1, Section 4 describes the envisaged operational characteristics of the Proposed Scheme and how they change when the remainder of Phase Two, as a whole, is operational.

HS2 services

2.4.2 It is anticipated that there would be up to six trains per hour in each direction upon opening in 2027, rising to up to 12 trains per hour each way passing through the South Cheshire area when the full Phase Two route is operational. Services are expected to operate between 05:00 and 24:00 from Monday to Saturday and between 08:00 and 24:00 on Sunday.

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

Maintenance

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

2.4.5 It is intended that inspections of the route would take place on a regular basis when the railway is not operating. There would be routine preventative maintenance, including grinding and milling of the rails in line with the maintenance strategy to keep them in good condition, and more periodic heavy maintenance as necessary.

2.4.6 Railway maintenance vehicles would be parked either at the HS2 Crewe IMD, described in section 2.2 of this report, or in the defined maintenance loops in Pipe Ridware, in the Fradley to Colton area (CA1). Further information on the maintenance loops can be found in Volume 2, CA1 Fradley to Colton.

HS2 Crewe IMD

2.4.7 The HS2 Crewe IMD would operate 24 hours a day, seven days a week once the Proposed Scheme is operational. Infrastructure maintenance operations, including routine line checks and replacement of tracks and overhead line equipment would be managed and resourced from the IMD. The planning, management and preparation for maintenance activities would be carried out at the IMD during the daytime. The majority of the maintenance works would be carried out at locations along the Proposed Scheme during the night time.

2.4.8 Volume 1, Section 4 provides further information about the maintenance activities carried out at or from the HS2 Crewe IMD.

2.4.9 It is currently anticipated that up to 300 staff would work out of the IMD in three, eight hour shifts during each 24 hour period. Therefore there would be approximately 80 to 100 people working at the HS2 Crewe IMD at any time. Staff access to the HS2 Crewe IMD would be from the realigned Crewe Road.

2.4.10 Supplies would be delivered to the depot via road or rail, depending on what is most efficient. The majority of heavy materials would arrive by rail, with an access road only being used for light equipment and spare parts or if rail transport is not appropriate. HGV access to the HS2 Crewe IMD would be from the B5071 Jack Mills Way.

2.4.11 Lighting would be required for all external working areas of the HS2 Crewe IMD, including general circulation areas and walkways, with enhanced lighting to loading areas. The height of lighting installations would be kept as low as possible to facilitate maintenance and to reduce light pollution. Further consideration will be given to lighting requirements as part of the design development of the Proposed Scheme and will be reported in the formal EIA Report.

2.4.12 A power supply would be required for the HS2 Crewe IMD. The power supply will be considered as part of the design development of the Proposed Scheme and will be reported in the formal EIA Report.

Operational waste and material resources

2.4.13 Forecasts of the amount of waste arising from railways stations and trains, rolling stock and track maintenance and ancillary infrastructure and the associated potential significant environmental effects are provided in Volume 3, Section 15.

2.5 Route section reasonable alternatives

Introduction

2.5.1 The strategic, route-wide and route corridor alternatives to the Proposed Scheme and local alternatives considered prior to November 2015 are presented in Volume 1 and in the Alternatives report as an appendix to the Volume 1. Local alternatives considered for the Proposed Scheme within the South Cheshire area since the route announcement in November 2015 are described in this section.

2.5.2 Since November 2015, as part of the design development process, a series of potentially feasible local alternatives has been reviewed within workshops attended by engineering, planning and environmental specialists. The potential environmental impacts of each design option have been reviewed during these workshops. The purpose of the reviews has been to ensure that the Proposed Scheme draws the appropriate balance between engineering requirements, cost and potential environmental impacts.

HS2 spurs crossing of and connection to the WCML

2.5.3 As part of the design development process since November 2015, further consideration has been given to where the HS2 spurs would need to cross the WCML and connect into the existing WCML infrastructure. This has included consideration of positioning the HS2 spurs in the optimum location and options relating to the best layout to connect into the WCML. This process has taken into consideration engineering requirements and impacts on the existing railway infrastructure and the surrounding road network, watercourses and drainage, and local communities.

2.5.4 The route announced in November 2015, consisted of a retained cut (which would connect into a tunnel portal and a tunnel (part of the proposed HS2 Phase 2b)), up to approximately 20m in depth and approximately 750m south of where Nantwich Road

crosses the WCML. It would be located within a complex arrangement of rail sidings between Crewe South Junction and Basford Hall Junction. The HS2 main line is positioned to the west of the existing WCML. An HS2 spur would therefore need to cross from west to east over the HS2 main line to connect in to WCML. The connection into the WCML would be north of where the A500 Shavington Bypass/Newcastle Road crosses the WCML. As the HS2 southbound spur would also need to connect into the easternmost WCML tracks a grade separated crossing over the WCML would be required, which would be located adjacent to Chorlton. The HS2 main line would approach the retained cut on viaduct, approximately 1.3km in length and up to 12m in height, crossing over the Basford Hall sidings and Basford Hall Junction tracks. The bridge carrying the A500 Shavington Bypass/Newcastle Road would be re-constructed over the proposed viaduct carrying the HS2 main line at a high level. The bridge carrying Weston Lane over the HS2 main line would similarly be required to be re-built at a higher level.

2.5.5 In reviewing this part of the design in further detail it was considered that there were complex engineering and interfacing operational issues associated with the route announced in November 2015 which required additional assessment. The proposed location of the crossing and connection into the WCML would result in an impact, during construction of the Proposed Scheme, on the operation of the WCML and Network Rail's regionally important freight and maintenance operations at Basford Hall and would result in the permanent loss of land and loss of rail access to some sidings. These sidings and associated rail connections into WCML are one of Network Rail's primary maintenance hubs for the entire WCML and are of great importance for regional freight operations. The proposed location would additionally require major changes to the surrounding road network.

2.5.6 The importance of the interface with existing railway infrastructure, including Network Rail's freight operations at Basford Hall, and the need to reduce disruption, during construction and operation on the WCML, has been instrumental in considering the design in this area. Disruption to the surrounding road network and the proximity of the Proposed Scheme to Chorlton has also been an important consideration.

2.5.7 As part of the development of the design an alternative option has been developed which seeks to limit the disruption to the existing rail infrastructure as well as minimising the land required for construction and operation by keeping the HS2 main line as close to the WCML as possible.

2.5.8 The retained cut would be relocated approximately 650m south of the A500 Newcastle Road/Shavington Bypass, which is approximately 2.1km further south than the route announced in November 2015. This would mean that the existing Basford Hall sidings would be largely unaffected by construction of the Proposed Scheme. The western track of the WCML would be diverted to the west of the existing WCML and two additional lines would run closely parallel to it, which would primarily carry freight traffic separating this from HS2 services coming from the HS2 spurs, where the spurs connect to the WCML. This diversion of the WCML western track and the additional two freight tracks would run parallel to and between the HS2 main line and the WCML. The three tracks would connect back to the WCML, at the south end, 900m south of Den Lane Bridge over the WCML. The three tracks connect back to the

WCML and Basford Hall Junction and sidings close to the A500 Newcastle Road/Shavington Bypass, at the north end of the diversion. The diverted WCML track and the two additional tracks enables the HS2 spurs to cross from west to east over the WCML track on a lower alignment and significantly further away from Chorlton. As the new section of the WCML would be built offline (for the majority of the diversion length) the effects of construction on the WCML and disruption to WCML passenger and freight is reduced. As such safety during construction is significantly improved.

2.5.9 The HS2 spurs would divert from the HS2 main line near Checkley Lane, which is approximately 2km south of the location in the route announced in November 2015. This would enable the required grade separated crossing of the HS2 main line by the HS2 northbound spur to be on a lower alignment and further away from Chorlton. This would also allow sufficient space for a neutral track section which would allow for trains to switch between HS2 and WCML operating systems.

2.5.10 The Newcastle Road/Shavington Bypass Bridge and Weston Lane Bridge would still need to be reconstructed but the height of the road crossings would be significantly reduced compared to the November 2015 route.

2.5.11 The location and reduction in height of viaducts and crossing structures would reduce visual impacts and noise for residential properties located within Chorlton. Construction activities would be predominantly limited to the west side of the WCML which would also reduce visual and noise impacts on residential properties. The layout of this option accommodates safe electrical separation between the traction systems of the HS2 main line and the WCML and improves access to Basford Hall junction for freight operations when compared to the existing layout.

2.5.12 The connection of the HS2 spurs into the WCML is the subject of ongoing detailed engineering and operational studies as part of the development of the design. These studies will consider engineering, environmental and operational impacts, and will be informed through continued engagement with Network Rail and other stakeholders. The outcome of these studies and any change to the design will be reported in the formal EIA Report.

HS2 Crewe IMD

2.5.13 As part of the design development process since November 2015, consideration has been given to the location of permanent maintenance facilities within the Phase 2a area in conjunction with the overall HS2 maintenance strategy.

2.5.14 The Proposed Scheme would include an IMD at the northern end of the South Cheshire area, which would operate as a base for maintenance activities to support the railway infrastructure.

2.5.15 As part of the development of the design, further work is being undertaken to consider the location and operating requirements of the permanent maintenance facilities. A potential alternative location near Stone, at the site of the proposed temporary railhead in the Stone and Swynnerton area (CA3), has been identified but not assessed as yet. The re-use of the railhead site would remove the cost of restoring the Stone railhead to its previous state and provide further economies through on-going use of the facilities during the post-construction phases. Locating the

permanent maintenance facilities near Stone could also mean that the maintenance loops located at Pipe Ridware, in the Fradley to Colton area (CA1) may not be required.

2.5.16 Further studies will be carried out to consider the location and the facilities to be included in the Proposed Scheme and the outcome of these studies will be reported in the formal EIA Report.

3 Stakeholder engagement and consultation

3.1 Introduction

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

3.1.2 This section summarises the engagement and consultation that has been undertaken within the South Cheshire area, since the route announcement in November 2015. It identifies the stakeholders who have been engaged during this process and how they have informed the design and assessment of the Proposed Scheme to-date.

3.1.3 These stakeholders include:

- technical and specialist groups/stakeholders;
- local authorities and parish councils;
- communities; and
- directly affected individuals and landowners.

3.1.4 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.

3.1.5 Whilst stakeholders have informed the design and assessment of the Proposed Scheme to-date, it is important to note that this is an ongoing process. Feedback from the consultation on the working draft EIA Report and emerging scheme design and ongoing engagement will continue to be considered as part of the ongoing design and assessment of the Proposed Scheme ultimately presented in the formal EIA Report.

3.2 Key Stages of Phase 2a engagement and consultation

3.2.1 The process of engagement began in 2009 and remains ongoing. A summary of engagement undertaken or underway since the route announcement in November 2015 is provided in Table 1 and reported in this section. This has included the draft SMR, property consultation and a series of meetings with national and local environmental stakeholders, local authorities, parish councils, individual landowners and organisations.

Table 1: Mechanisms and timeline of stakeholder engagement since route announcement

Date	Engagement and consultation activity and mechanisms	Stakeholders engaged/consulted
December 2015 – ongoing	Commencement of direct engagement for the development of the Proposed Scheme and assessment.	Direct engagement with local authorities and councils, and with technical and specialist stakeholders.

Date	Engagement and consultation activity and mechanisms	Stakeholders engaged/consulted
8 March 2016 – 13 May 2016	Consultation on the draft EIA and Equality Impact Assessment (EQIA) SMR to inform the EIA and EQIA	Published and made available nationally on HS2 website[16]. Technical and specialist stakeholders, and councils, directly invited to participate.
January 2016 – ongoing	Site visits with farmers and growers.	Direct engagement with individual farmers and growers.
November 2015 – February 2016	Consultation on property compensation with owners and occupiers.	Direct engagement with owners and occupiers.
September 2016 – November 2016	Consultation on the working draft EIA Report, EQIA Report and design refinements.	Direct engagement with communities through public events and documents available at a range of community locations across the route.

3.3 Technical and specialist groups

3.3.1 Engagement has been undertaken with technical and specialist groups to provide appropriate specialist input, as and where appropriate. Stakeholders engaged in this context include:

- Environment Agency;
- Natural England;
- Historic England;
- Canal & River Trust;
- Department of Environment Food and Rural Affairs (Defra);
- Food and Environment Research Agency (FERA);
- Woodland Trust;
- British Geological Survey (BGS);
- National Farmers Union;
- Country Land and Business Association;
- Highways England; and
- Cheshire Wildlife Trust.

[16] UK Government: HS2 Phase Two: West Midlands to Crewe Draft Environmental Impact Assessment Scope and Methodology Report consultation. Available online at: https://www.gov.uk/government/consultations/hs2-phase-two-west-midlands-to-crewe-draft-environmental-impact-assessment-scope-and-methodology-report-consultation

3.3.2 Engagement with these stakeholders has been instrumental in providing detailed specialist baseline information to inform the working draft EIA Report and the design development of the Proposed Scheme.

3.3.3 Local organisations with a specialist interest in the community, for example the Cheshire Wildlife Trust, have been engaged and have informed individual technical assessments such as the ecological assessment.

3.3.4 Further information about topic-specific engagement is provided in Sections 4 to 15.

3.3.5 Engagement is ongoing with utility companies and statutory stakeholders such as Network Rail and the Oil and Pipelines Agency to establish what infrastructure exist in the South Cheshire area and how it may need to be modified as part of the Proposed Scheme.

3.4 Local authorities and parish councils

3.4.1 The South Cheshire area is represented by the following county, borough, district and parish councils:

- Cheshire East Council;
- Checkley cum Wrinehill Parish Council;
- Blakenhall Parish Council;
- Hough and Chorlton Parish Council;
- Weston and Basford Parish Council; and
- Crewe Town Parish Council.

3.4.2 Direct engagement has been undertaken with these councils to collate appropriate local baseline information, identify and understand issues and concerns, and provide a mechanism for ongoing dialogue and discussion on the emerging assessment.

3.4.3 Engagement has focused on the technical areas which inform the assessment, including, cultural heritage, ecology and biodiversity, land quality, landscape and visual, sound, noise and vibration, traffic and transport, water and flood risk, amongst others topics.

3.4.4 Some key discussion and inputs gained from engagement with Cheshire East Council, Weston and Basford Parish Council, Hough and Chorlton Parish Council, along with Hatherton and Walgherton Parish Council and Wybunbury Parish Council (which border the South Cheshire area), include:

- discussions with regard to the planned highways and PRoW routes, noting local conditions and concerns regarding traffic, congestion and community impact;
- understanding and gathering information on listed buildings and local sites of archaeological interest;
- gathering information on the potential contamination of local sites to inform the development of the Proposed Scheme and the land quality assessment;

- collating information regarding water, flood risk and groundwater issues within the local area and identifying vulnerabilities to flooding or groundwater issues to inform the development of the Proposed Scheme and assessment;
- agreeing appropriate viewpoints for assessing impacts to the landscape and visual assessment;
- identifying local locations for surveying and data collection to inform the sound, noise and vibration assessment; and
- understanding the local community and any particular sensitivities or vulnerabilities of its members, to inform the community and health assessments and the separate EQIA.

3.4.5 Councils will continue to be engaged as part of the design development of the Proposed Scheme with ongoing dialogue on key topics such as highways, PRoW and the draft CoCP.

3.5 Communities

3.5.1 Community stakeholders in the area include a range of local interest groups, local facility and service providers, schools and educational establishments.

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

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

3.5.4 As part of the consultation process for this working draft EIA Report and on refinements to the design, public events are being held in communities across the route of the Proposed Scheme. Communities have been notified of these events through a range of publicity, including a mail out to properties along the line of route, newspaper adverts and posters sent to local venues. Documents have been made available online and in community libraries.

3.6 Directly affected individuals and landowners

3.6.1 This group includes farmers, growers and those with residential property potentially affected by the Proposed Scheme.

Farmers and growers

3.6.2 Engagement is ongoing with farmers and growers whose land or property would be directly affected by the Proposed Scheme, whether permanently or temporarily. The

purpose of this engagement has been to obtain baseline information and provide them with the opportunity to raise issues and discuss mitigation in relation to the Proposed Scheme. For example, the location of environmental mitigation has been refined to reduce the loss of agricultural land and the location of accommodation overbridges across the route have been refined to better reflect the need of farmers.

3.6.3 Nine farm visits have been undertaken in this area and these will continue, as appropriate, as the Proposed Scheme develops.

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

Property consultation

3.6.5 A property consultation took place between 30 November 2015 and 25 February 2016. Its purpose was to inform the Government's decision on whether the compensation and assistance schemes in place for Phase One would be altered for Phase 2a, based on the views of those individuals and organisations who expressed their opinions on the proposals.

3.6.6 The analysis of consultation responses was summarised in HS2 Phase Two: West Midlands to Crewe Property Consultation 2015. A report to HS2 Ltd and the Department for Transport[17] and the Government response issued in the Decision Document HS2 Phase Two: West Midlands to Crewe Property Consultation 2015[18].

3.6.7 A programme of property consultation events has been undertaken route-wide, in parallel to the working draft EIA process. Within the local area, a property consultation event was held for landowners and individuals at Hough Village Hall on the 14 January 2016. The purpose of the property consultation was to give members of the public the opportunity to speak with property, environment and engineering specialists about the details of the Government's proposals for compensation and assistance for property owners living in the South Cheshire area.

3.7 SMR consultation

3.7.1 The draft SMR was formally consulted on in March to May 2016. As set out in Volume 1, the draft SMR was issued to statutory bodies, non-government organisations and local authorities. It was also available on the Government's website, allowing comment by local interest groups and the public.

3.7.2 Twenty six responses to the draft SMR were received, as a result of which changes were made to the SMR. These are set out in the SMR Consultation Report published alongside this working draft EIA Report and will be used to inform the assessment methodologies applied for the formal EIA Report.

[17] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/526063/HS2_Phase_2a_Property_Consultation_2015_Response_Summary_Report.pdf

[18] UK Government: HS2 Phase Two: West Midlands to Crewe Property Consultation 2015. Available online at: https://www.gov.uk/government/consultations/hs2-phase-two-west-midlands-to-crewe-property-consultation-2015

3.8 Informing the Proposed Scheme

3.8.1 The main purpose of stakeholder engagement and consultation at this early stage is to inform the Proposed Scheme. Volume 1 details the engagement and consultation undertaken prior to route announcement in November 2015.

3.8.2 The main themes to emerge from stakeholder engagement in the South Cheshire area since the route announcement in November 2015, and which are informing the Proposed Scheme are:

- retention or realignment of PRoWs;
- potential impacts on landscape character and visual receptors, with a key consideration being the height of embankments and viaducts;
- potential impact of noise during construction and operation of the Proposed Scheme, with a particular consideration being the viaducts;
- mitigation measures for increased pressure on local roads as a result of road closures or construction traffic;
- refining the location of balancing ponds and environmental mitigation to minimise the loss of agricultural land; and
- provision of access to severed agricultural land, including access under viaducts and the provision of farm access tracks.

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

3.9 Consultations on the working draft EIA Report and ongoing engagement

3.9.1 As set out in Volume 1, the working draft EIA Report is being formally consulted upon between September and November 2016. Parallel consultations on the working draft EQIA and refinements to the design are also being undertaken during this period. As part of the process of consultation, stakeholders are invited to comment on the Proposed Scheme and the working draft EIA and EQIA which informs it.

3.9.2 These consultations and wider feedback from ongoing stakeholder engagement will continue to be considered as part of the ongoing design of the Proposed Scheme, the assessment and identification of mitigation opportunities for the South Cheshire area.

3.9.3 A consultation summary report will be published with the formal EIA Report explaining how the responses have been taken into consideration.

4 Agriculture, forestry and soils

4.1 Introduction

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

4.1.2 The quality of agricultural land in England and Wales is assessed according to the Agricultural Land Classification (ALC)[19] system, which classifies agricultural land into five grades from excellent quality Grade 1 land to very poor quality Grade 5 land. Grade 3 is subdivided into Subgrades 3a and 3b. The main issue in the assessment of the impacts on agricultural land is the extent to which land of best and most versatile (BMV) agricultural quality (Grades 1, 2 and 3a) is affected by the Proposed Scheme.

4.1.3 Forestry is considered as a land use feature and the impacts have been calculated quantitatively. The qualitative effects on forestry land and woodland are addressed principally in Section 8, Ecology and biodiversity, and Section 11, Landscape and visual.

4.1.4 Soil attributes, other than for food and biomass production, are identified in this section but the resulting function or service provided is assessed in other sections, notably Section 7, Cultural heritage; Section 8, Ecology and biodiversity; and Section 11, Landscape and visual.

4.1.5 The main issue for farm holdings is disruption by the Proposed Scheme of the physical structure of agricultural holdings and the operations taking place upon them, during both construction and operational phases.

4.1.6 Engagement with farmers and landowners has been undertaken. The purpose of the engagement has been to obtain baseline information on the scale and nature of the farm and forestry operations and related farm-based uses, and to provide farmers and landowners with the opportunity to raise issues and discuss mitigation in relation to the Proposed Scheme. Engagement with farmers and landowners will continue as part of the development of the Proposed Scheme, with progress documented in the Farmer's Pack[20] for each farm holding.

4.1.7 Maps showing the location of the key environmental features and the key construction and operation features of the Proposed Scheme can be found in the Volume 2, CA5 Map Book.

[19] Ministry of Agriculture, Fisheries and Food (1988), Agricultural Land Classification of England and Wales – Revised guidelines and criteria for grading the quality of agricultural land.
[20] HS2 Guide for Farmers and Growers (2016). Available online at https://www.gov.uk/government/publications/hs2-guide-for-farmers-and-growers

4.2 Scope, assumptions and limitations

4.2.1 The assessment scope, key assumptions and limitations for the agriculture, forestry and soils assessment are set out in the draft SMR and Volume 1.

4.2.2 The study area for the agriculture, forestry and soils assessment covers all of the open and undeveloped land that would be required for the construction and operation of the Proposed Scheme. The resources and receptors that are assessed within this area are agricultural land, forestry land and soils, together with farm and rural holdings. The assessments of the impacts on agricultural land quality and forestry land are made with reference to the prevalence of BMV land and forestry land in the general locality, taken as 2km either side of the centre line of the Proposed Scheme.

4.2.3 Common assumptions that have been used in assessing the effects of the Proposed Scheme are set out in Volume 1. These assumptions include the restoration of agricultural land that is required temporarily for construction to agricultural use, the handing back of land used temporarily to the original landowner and the non-replacement of capital items demolished. There are no assumptions or limitations that are specific to the assessment in this study area.

4.3 Environmental baseline

Introduction

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

Soil and land resources

Geology and soil parent materials

4.3.2 The BGS maps the bedrock geology as mudstone in the north and south of this community area, separated by the Wilkesley Halite Member, which comprises halite (rock salt) with partings of mudstone.

4.3.3 The Sidmouth Mudstone Formation is mapped in the south around Wrinehill and Checkley. This formation comprises structureless mudstone and siltstone. The superficial deposits overlying the mudstone are mostly glacial till, which comprises unsorted material ranging in size from clay to boulders (hence also commonly referred to as boulder clay). These deposits are mapped across shallow slopes and flat land at low altitudes. There are also alluvium deposits associated with the Checkley Brook in the south of the area at Wrinehill. These deposits typically comprise consolidated silty clay, but may also contain silt, sand, peat and gravel. Glaciofluvial sands and gravels are also deposited over the mudstone at slightly higher elevations and on moderate to steep slopes.

4.3.4 West of Wrinehill, the Sidmouth Mudstone borders a small unit of the Northwich Halite Member and a swathe of the Wilkesley Halite Member that extends to Chorlton. The superficial deposits are predominantly glaciofluvial sands and gravels on moderate to steep slopes and plateaux in the south of the area near Wrinehill.

Further north these deposits occur on lower lying, flatter land. There are also superficial deposits of alluvium and peat that are associated with the shallow valley of the Gresty Brook (also known as the Basford Brook, Mere Gutter and Wistaston Brook).

4.3.5 The mudstone in the area to the north of Chorlton is overlain mostly by superficial deposits of glacial till. There is also a small area of alluvium associated with the Gresty Brook. A full description of the geological characteristics of this area is provided in Section 10, Land quality.

Topography and drainage

4.3.6 The main topographical feature is a largely level, low-lying plain that extends throughout the study area, although there are localised moderate to steep slopes in the south of the study area. Altitude is around 80m to 90m above Ordnance Datum (AOD) in the south, which falls gently to 65m to 70m AOD at Chorlton, and to 50m AOD to the south of Crewe. Land drainage is mostly via the Gresty Brook, the Checkley Brook and the Swill Brook, and there are numerous ponds present throughout the area. There is no significant flood risk identified in this area that would affect agricultural land quality. Further details are provided in Section 15, Water resources and flood risk.

Description and distribution of soil types

4.3.7 The characteristics of the soils are described by the Soil Survey of England and Wales[21],[22] and shown on the National Soil Map[23].

4.3.8 There are two groups of soil associations in this area. The first comprises loamy sand or sandy loam topsoils over sandy loam, loamy sand or sand subsoils, developed in glaciofluvial deposits. This group includes the Blackwood, Newport 1 and Wick associations. Profiles are mostly well drained (Wetness Class (WC) I)[24], although the Blackwood soils can be affected by groundwater and are commonly imperfectly or poorly drained (WC III or IV).

4.3.9 The second soil type includes the Clifton and Crewe associations, which are characterised by clay loam or sandy clay loam topsoil over similar-textured, or heavier clay subsoils. The subsoil is generally slowly permeable and the profiles are typically poorly drained (WC IV).

[21] Soil Survey of Great Britain - England and Wales (1964), The Soils of the West Midlands, Bulletin No. 2, Harpenden.
[22] Soil Survey of England and Wales (1984), Soils and their use in Midland and Western England, Soil Survey of England and Wales, Bulletin No. 12, Harpenden.
[23] Cranfield University (2001), The National Soil Map.
[24] The Wetness Class of a soil is classified according to the depth and duration of waterlogging in the soil profile and has six categories from WCI which is well drained to WCVI which is very poorly drained.

Soil and land use interactions

Agricultural land quality

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

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

4.3.12 Climate within this area does not in itself place any limitation upon agricultural land quality. However, the interactions of climate with soil characteristics are important in determining the wetness and droughtiness[25] limitations of the land.

4.3.13 The local agro-climatic data have been interpolated from the Meteorological Office's standard 5km grid point dataset[26] for two points within the area. The data show climate in the area to be moist and moderately cool. The number of Field Capacity Days (FCD), when the soil moisture deficit is zero, ranges from 172 to 178 days. This is higher than the average for lowland England (150 days) and generally constrains agricultural cultivation and soil handling for relatively long periods over winter. Soil moisture deficits are moderate to moderately small, indicating a reduced susceptibility to droughtiness.

4.3.14 Site factors include gradient and microrelief, which may be limiting to agricultural land quality in the south of the area, particularly near Wrinehill.

4.3.15 The main physical limitations that result from interactions between soil, climate and site factors are soil wetness, soil droughtiness and a localised susceptibility to erosion. Each soil can be allocated a WC based on soil structure, evidence of waterlogging and the number of FCDs. The topsoil texture then determines its ALC Grade.

4.3.16 The well drained, coarse-textured profiles of the first group of associations (particularly the Newport 1 and Wick soils) is most likely to be affected by soil droughtiness, the severity of which will be determined by factors such as soil texture and stone content. As soil moisture deficits are moderate to moderately small in this area, droughtiness limitations are likely to be slight, potentially to Grade 2 and Subgrade 3a.The detailed Ministry of Agriculture, Fisheries and Food (MAFF) ALC survey at Weston Hall[27] has confirmed that the sandy loam topsoils over loamy sand and sand subsoils in this area are limited by soil droughtiness to mostly Grade 2, with some areas more severely limited to Subgrade 3a.

4.3.17 However, the Blackwood soils, which also comprise coarse-textured soils, are affected by soil wetness and workability. These are likely to be classified as Subgrade 3a or 3b, depending upon the specific site circumstances and the effects of groundwater.

4.3.18 The second group of associations (Clifton and Crewe) that comprises poorly drained profiles (WC IV) with clay loam or sandy clay loam topsoils over heavier subsoils are

[25] A measure of the likely moisture stress in a crop arising from the crop's requirement for water exceeding the available water capacity in the soil.
[26] Meteorological Office (1989), Gridpoint Meteorological data for Agricultural Land Classification of England and Wales and other Climatological Investigations.
[27] MAFF, Resource Planning Group (1989), Report of the MAFF Agricultural Land Classification Survey (1988) – Weston Hall

limited by soil wetness and workability to mostly Subgrade 3b. Where the topsoils are heavy loams, the profiles are likely to be downgraded to Grade 4. The detailed MAFF ALC survey at Weston Hall also included areas of clay loam and sandy clay loam topsoils over clay, which were assessed as WC IV and classified as Subgrade 3b on a soil wetness and workability limitation.

4.3.19 Department for Environment, Food and Rural Affairs (Defra) mapping[28] shows that there is generally a high likelihood of encountering BMV agricultural land in the locality, which makes such land a resource of low sensitivity in this study area.

Other soil interactions

4.3.20 Soil fulfils a number of functions and services for society, in addition to those of food and biomass production, which are central to social, economic and environmental sustainability. These are outlined in sources such as the Soil Strategy for England[29] and The Natural Choice: securing the value of nature[30], and include:

- the storage, filtration and transformation of water, carbon and nitrogen in the biosphere;
- support of ecological habitats, biodiversity and gene pools;
- support for the landscape;
- protection of cultural heritage;
- providing raw materials; and
- providing a platform for human activities, such as construction and recreation.

4.3.21 Forestry resources represent a potentially multifunctional source of productive timber, landscape amenity, biodiversity and carbon storage capacity. An assessment of the value and sensitivity of woodland resources is reported in Section 8, Ecology and biodiversity.

4.3.22 The floodplains of the Gresty Brook and Checkley Brook occupy land where water flows or is stored in times of flood, as set out in Section 15, Water resources and flood risk. Although Section 15 indicates that no significant fluvial flooding events are recorded in the vicinity of the Proposed Scheme in this area, the soils in these areas nevertheless function as water stores for flood attenuation, as well as providing a habitat for ecology and biodiversity.

Land use

Land use description

4.3.23 Agricultural land use in the South Cheshire area is predominantly pasture, although there are large blocks of arable land near Wrinehill and north-east of Hough. The field pattern is more irregular between Blakenhall and Hough, with small grassland fields directly south of Hough.

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

4.3.24 There are no substantial individual woodlands within the study area.

4.3.25 A number of environmental designations potentially influence land use within the area. The whole area is a nitrate vulnerable zone where statutory land management measures apply that seek to reduce nitrogen losses from agricultural sources to water. Some agricultural land is also subject to agri-environment management prescriptions that seek to retain and enhance the landscape and biodiversity qualities and features of farmland. These are associated with the Environmental Stewardship Scheme (the Entry Level Scheme (ELS) or Higher Level Scheme (HLS)), or the Countryside Stewardship Scheme (CSS), which has replaced Environmental Stewardship. Holdings that have land entered into an agri-environment scheme are identified in Table 2.

Number, type and size of holdings

4.3.26 Table 2 sets out the current understanding of the main farm holdings within this area. The details of holdings have been obtained from face-to-face interviews with the farm owners and occupiers. Other farm holdings may be identified as survey work continues and the design develops.

4.3.27 Table 2 sets out the sensitivity of individual holdings to change. This is determined by the extent to which they have the capacity to absorb or adapt to impacts, which in turn is determined primarily by their nature and scale. In general terms, larger holdings have a greater capacity to change enterprise mix and scale, can better absorb impacts and are less sensitive. Units that rely on the use of buildings (such as intensive livestock and dairy farms, and horticultural units) are less able to accommodate change and have a higher sensitivity. Smaller (less intensively used) units, such as pony paddocks associated with residential properties, have a low sensitivity.

Table 2: Summary characteristics of holdings

Holding reference/ name	Holding type	Holding size (ha)	Diversification	Agri-environment scheme	Sensitivity to change
The Grange	Poultry, arable and sheep	372	None	None	High
Lower Den Farm	Dairy, beef and arable	258	Shoot, wind turbine, phone masts	ELS and HLS	High
Ash Tree Farm	Dairy and arable	201	Shoot	ELS	High
Oakhanger Hall	Dairy (forage, arable and off-lying grazing)	304	None	ELS	Medium
Ellesmere Dairy Farm	Dairy	304	Paintball	ELS	High
Casey Lane Stables	Equestrian livery	6	None	None	Low
Heath Farm	Arable	100	DIY livery, agricultural	None	Medium

Holding reference/ name	Holding type	Holding size (ha)	Diversification	Agri-environment scheme	Sensitivity to change
			contracting, workshop		
Basford Hall Farm	Equestrian	2	None	None	Low
Larch Farm	Arable and grassland	123	Residential let	None	Medium

4.4 Effects arising during construction

Avoidance and mitigation measures

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

4.4.2 Compliance with the draft CoCP would avoid or reduce environmental impacts during construction. Those measures that are particularly relevant relate to: the handling of soils and their reinstatement to subsequent agricultural, forestry and other open land uses; and arrangements to ensure that agriculture can continue to function adjacent to the works during and following the construction period.

4.4.3 There would be no reduction in the long-term capability or quality of land where agricultural or forestry uses are to be resumed, provided good practice techniques are used to handle, store and reinstate soils. Some land with heavier textured soils (particularly the Clifton and Crewe association soils) may also require careful management during the aftercare period to ensure this outcome.

Assessment of impacts and effects

Introduction

4.4.4 The acquisition and use of land for the Proposed Scheme would interfere with existing uses of that land and, in some locations, would preclude existing land uses and, in places, sever and fragment individual fields and operational units of agricultural and forestry land. This would result in potential effects associated with the ability of affected agricultural interests to continue to access and effectively use residual parcels of land. There may also be the loss of, or disruption to, buildings and operational infrastructure such as drainage. The Proposed Scheme design seeks, however, to minimise this disruption and, where appropriate and reasonably practicable, to incorporate inaccessible severed land as part of environmental mitigation works.

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

- part of the operational railway and kept under the control of the operator;
- returned to agricultural use (with aftercare management to ensure stabilisation of the soil structure, to be undertaken normally by the owner and/or occupier, except where remedial operations are required which would be undertaken by the nominated undertaker);
- used for drainage or replacement flood storage, which may also retain some agricultural use; or
- used for ecological and/or landscape mitigation; the ownership and responsibility for managing agricultural land reinstated to landscape planting, new woodland and new ecological habitats would be the subject of agreements with existing land owners.

Temporary effects during construction

Impacts on agricultural land

4.4.6 ALC surveys are ongoing, however, current indications show that the Proposed Scheme is likely to require approximately 500ha of agricultural land in the South Cheshire area during the construction phase. Of this total, about 210ha (42%) is likely to be classified as BMV land (Grades 2 and 3a). In addition, there are areas of scattered woodland within the area required for construction in the South Cheshire area.

4.4.7 As BMV land in this local area is a receptor of low sensitivity, the potential effect on BMV land during the construction phase is assessed as a likely minor adverse effect of the Proposed Scheme, which is not significant.

4.4.8 Following completion of construction, temporary facilities would be removed and the topsoil and subsoil would be reinstated in accordance with the agreed end use for the land. Overall for Phase 2a, it is currently estimated that there would not be any significant surplus of topsoil or subsoil material arising from the Proposed Scheme. Some permanently displaced soils may be used to restore land to agriculture with slightly deeper topsoil and subsoil layers, or other uses where appropriate. This could improve the quality of agricultural land locally, for example where droughty soils are limited by soil depth, subject to the soil resource plans that would be prepared during the detailed design stage.

Nature of the soil to be disturbed

4.4.9 The sensitivity of the soils that would be disturbed by construction activity reflects their textural characteristics, in the light of local rainfall conditions, as set out in the draft SMR. Soils with high clay and silt fractions in areas of heaviest rainfall are most susceptible to the effects of handling during construction and the re-instatement of land; whereas soils with a high sand fraction in areas of lowest rainfall are the least susceptible.

4.4.10 Successful soil handling is dependent upon movements being undertaken under appropriate weather and ground conditions using the appropriate equipment. The principles of soil handling are well established and set out in advisory material such as

Defra's Code of Practice for the Sustainable Use of Soils[31]. These principles would be followed throughout the construction period.

4.4.11 The disturbance of peat soils has implications for carbon emissions and biodiversity. Design development of the Proposed Scheme would seek to reduce disturbance of any deep peat soils as far as possible. Where disturbance cannot be avoided, the peat soils would be handled with particular care and when reinstated, opportunities would be taken to use them to create habitats and enhance biodiversity.

4.4.12 The seasonally waterlogged Clifton and Crewe associations are least able to remain structurally stable when moved in wet conditions or by inappropriate equipment. They are susceptible to compaction and smearing, which could affect successful reinstatement.

Impacts on holdings

4.4.13 Land may be required from holdings both permanently and temporarily (i.e. the latter just during the construction period). In most cases, the temporary and permanent land requirement would occur simultaneously at the start of the construction period and it is the combined effect of both that would have the most impact on the holding. In due course, some agricultural land would be restored and the impact on individual holdings would be reduced.

4.4.14 The effects of the Proposed Scheme on individual agricultural and related interests during the construction period will be reported in the formal EIA Report. The assessment will consider the total area of land required on a particular holding during the construction phase in absolute terms and as a percentage of the total area farmed. It will also show the area of land that would be returned to the holding following the construction period. The scale of effect will be based on the proportion of the holding required rather than the absolute area of land.

4.4.15 The effects of severance during construction will be judged on the ease and availability of access to severed land. These would mostly be the same during and post construction but occasionally they would differ between the two phases. The disruptive effects, principally of construction noise and dust, will be assessed in the formal EIA Report according to their effects on land uses and enterprises.

Permanent effects of construction

Impacts on agricultural and forestry land

4.4.16 The extent of land required permanently for the Proposed Scheme by ALC grade, following construction and restoration to the agreed end use, is not yet known but will be reported in the formal EIA Report.

Impacts on holdings

4.4.17 The potential permanent residual effects from the construction of the Proposed Scheme on individual agricultural and related interests are summarised for those holdings that have been surveyed in Table 3. The scale of effect of the land potentially required is based on the likely proportion of land required from the holding. The

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

potential effects of severance are judged on the ease and availability of access to severed land once construction is completed. The impact on farm infrastructure refers mainly to the potential loss of or damage to farm capital, such as property, buildings and structures, and the consequential effects on land uses and enterprises.

Table 3: Summary of potential permanent effects on holdings from construction

Holding reference/name	Land potentially required	Potential severance impact	Potential impact on farm infrastructure	Potential scale of effect
The Grange	Low	Medium	Low	Major/moderate adverse
Lower Den Farm	Low	Low	Negligible	Moderate adverse
Ash Tree Farm	Low	Negligible	Negligible	Moderate adverse
Oakhanger Hall	High	Medium	Low	Major/moderate adverse
Ellesmere Dairy Farm	Low	Low	Low	Moderate adverse
Casey Lane Stables	Medium	Negligible	Negligible	Minor adverse
Heath Farm	High	Negligible	High	Major/moderate adverse
Basford Hall Farm	High	Negligible	High	Moderate adverse
Larch Farm	Negligible	Negligible	High	Major/moderate adverse

4.4.18 Overall, the construction of the Proposed Scheme will potentially affect nine holdings in the South Cheshire area. On the basis of information currently available, eight could experience moderate or major/moderate adverse permanent effects from construction, which would be significant.

4.4.19 Four holdings are currently anticipated to experience major/moderate adverse effects due to high impacts on farm infrastructure at Larch Farm, which could incur demolition including the potential loss of a residential property, and infrastructure at Heath Farm; high impacts on land required at Oakhanger Hall and Heath Farm; and medium severance impacts at The Grange. The holdings currently anticipated to experience moderate adverse effects are mostly dairy units which would incur low impacts of land required and severance. One holding of low sensitivity (Basford Hall Farm) would incur high impacts on farm infrastructure and on land required.

4.4.20 Although financial compensation would be available, there can be no certainty that this would be used to reduce the above adverse effects by the purchase of replacement land or construction of replacement buildings. Therefore, the above assessment should be seen as the worst-case, which could be reduced if the owner

and/or occupier is able, and chooses, to use compensation payments to replace assets.

Other mitigation measures

4.4.21 No other mitigation measures have currently been identified.

Summary of likely residual significant effects

4.4.22 Although the extent of land required permanently by ALC grade is unknown, current indications are that the effect on BMV agricultural land during construction would not be significant in the South Cheshire area.

4.4.23 Eight of the nine farm holdings identified are anticipated to experience moderate or major/moderate adverse permanent effects from construction. Four of these holdings would experience major/moderate adverse effects, whilst the remaining four would experience moderate adverse effects.

4.5 Effects arising from operation

Avoidance and mitigation measures

4.5.1 No measures are anticipated to be required to mitigate operational effects of the Proposed Scheme on agriculture, forestry and soils, although further work may be required to assess potential noise effects on livestock units.

Assessment of impacts and effects

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

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

4.5.3 The potential for significant effects on sensitive livestock receptors from noise will be assessed and reported in the formal EIA Report. Farm buildings at The Grange and Ellesmere Dairy Farm lie close to (within 100m) of the Proposed Scheme. Both house livestock and further work will be required to identify if any significant effects on the use of these buildings are anticipated.

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

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

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

Other mitigation measures

4.5.6 No other mitigation measures have currently been identified.

Summary of likely residual effects

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

5 Air quality

5.1 Introduction

5.1.1 This section of the report provides an assessment of the impacts and likely significant effects on air quality arising from the construction and operation of the Proposed Scheme within the South Cheshire area.

5.1.2 Nitrogen dioxide (NO_2), oxides of nitrogen (NO_x), fine particulate matter (PM10, PM2.5) and dust[32] were considered in the assessment. Emissions of these air pollutants are likely to arise from construction activities, demolition, site preparation works and the use of haul routes. Emissions would also arise from road traffic during construction and operation of the Proposed Scheme.

5.1.3 Engagement with CEC has been undertaken. The purpose of this engagement has been to obtain relevant baseline information. Engagement with CEC will continue as part of the development of the Proposed Scheme.

5.1.4 Maps showing the location of the key environmental features and the key construction and operation features of the Proposed Scheme can be found in the Volume 2, CA5 Map Book.

5.2 Scope, assumptions and limitations

5.2.1 The scope, assumptions and limitations for the air quality assessment are set out in Volume 1 and the draft SMR.

5.2.2 The study area for the air quality assessment has been determined on the basis of where impacts on local air quality may occur from construction activities, from changes in the nature of traffic during construction and operation, or where road alignments have changed.

5.3 Environmental baseline

Background air quality

5.3.1 The main sources of air pollution in the South Cheshire area are emissions from road vehicles, agricultural activities and emissions from industrial processes. The main roads within the area are the M6, the A500 Newcastle Road/Shavington Bypass, the A534 Crewe Road, the A531 Newcastle Road, the A51 Nantwich Bypass, the A51 London Road, the A5020 Weston Road/University Way/David Whitby Way, the A532 Weston Road, the B5071 Crewe Road/Jack Mills Way/Gresty Road and local roads serving the settlements of Shavington, Weston, Chorlton, Hough, Wybunbury and Blakelow. There are also three industrial installations (regulated by the Environment Agency) with emissions to air, namely the Whitehead Landfill, the Crewe Fluorinated Container Manufacture Plant and the North Western Mills. The contribution of all industrial processes and other emission sources to local air quality is included within the background concentrations.

[32] PM2.5 and PM10 describe two size fractions of airborne particles that can be inhaled and therefore are of concern for human health. The designations refer to particles of size less than 2.5 and 10 microns in diameter.

5.3.2 Estimates of background air quality have been obtained fromDefra for the baseline year of 2015. The data is estimated for 1km grid squares for NO_x, NO_2, PM10 and PM2.5. Background concentrations are within the air quality standards for all pollutants within the area.

Local monitoring data

5.3.3 There are currently 30 diffusion tube sites and one continuous monitoring site located within the South Cheshire area for monitoring NO_2 concentrations. Measured concentrations in 2014[33] were within the air quality standard for most sites, while exceedances of the air quality standard for NO_2 were reported at a few monitoring sites in Nantwich.

Air quality management areas

5.3.4 There is one air quality management area (AQMA) within the South Cheshire area, declared for exceedances of the annual mean NO_2 objective. This is the Nantwich Road AQMA, extending from the junction with Walthall Street to the junction with Pedley Street.

Receptors

5.3.5 Several locations have been identified in the study area as sensitive receptors, which are considered to be susceptible to changes in air quality due to their proximity to dust- generating activities, traffic routes during construction and operation of the Proposed Scheme. Most of the receptors located close to the route are residential.

5.4 Effects arising during construction

Avoidance and mitigation measures

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

5.4.2 The draft CoCP also makes provision for the preparation of LEMPs. These plans would set out how, during construction of the Proposed Scheme, the environmental and community protection measures required for each area would be delivered, including through the implementation of specific measures required to control dust and other emissions from activities in the area.

5.4.3 The assessment has assumed that the general measures detailed in the draft CoCP would be implemented. These include:

- contractors being required to manage dust, air pollution, odour and exhaust emissions during construction works;

[33] Monitoring data for 2015 is not yet available. This will be included in the formal EIA Report.

- inspection and visual monitoring after engagement with the local authorities to assess the effectiveness of the measures taken to control dust and air pollutant emissions;
- cleaning (including watering) of haul routes and designated vehicle waiting areas to suppress dust;
- keeping soil stockpiles away from sensitive receptors where reasonably practicable, also taking into account the prevailing wind direction relative to sensitive receptors;
- using enclosures to contain dust emitted from construction activities; and
- undertaking soil spreading, seeding and planting of completed earthworks as soon as reasonably practicable following completion of earthworks.

Assessment of impacts and effects

Temporary effects

5.4.4 Impacts from construction of the Proposed Scheme could arise from dust-generating activities and emissions from construction traffic. As such, the assessment of construction impacts has been undertaken for dust soiling and exposure to NO_2, PM10 and PM2.5 concentrations.

5.4.5 Construction activities, such as demolition, earthworks, construction and trackout[34], have been assessed for their risk to have an effect on dust soiling and human health[35]. There are residential receptors located within 350m of these activities in this area.

5.4.6 In the absence of mitigation, there is a low risk of dust soiling and negligible risk of human health effects arising from demolition activities at receptors close to the works along the route of the Proposed Scheme. For earthworks, there is a low risk of dust soiling and human health effects at receptors close to the works along the route of the Proposed Scheme. There is also a low risk of dust soiling and human health effects from construction activities at receptors close to the proposed compounds locations. For trackout, there is a medium risk of dust soiling and low risk of human health effects at receptors along the construction traffic routes and close to the works.

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

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

5.4.9 The M6, the A51 London Road and the A500 Newcastle Road/Shavington Bypass would provide the primary access routes for construction vehicles in this area. An increase in traffic flows as a result of construction traffic, temporary closures and diversions or realignments is anticipated on the M6, the A51 London Road, the A500 Newcastle Road/Shavington Bypass, the A531 Newcastle Road, the B5071 Wybunbury

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

Lane/Bridge Street, Newcastle Road, Weston Lane, Chorlton Lane, Wrinehill Road/Den Lane and the B5071 Jack Mills Way. It is not anticipated that changes to traffic flows, and therefore air quality, would occur within the Nantwich Road AQMA. A detailed assessment of air quality impacts from traffic emissions in the area will be undertaken and reported in the formal EIA Report.

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

Permanent effects

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

Other mitigation measures

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

Summary of likely residual significant effects

5.4.13 The methods outlined within the draft CoCP are considered effective at reducing dust emissions and no significant residual effects are considered likely.

5.5 Effects arising from operation

Avoidance and mitigation measures

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

Assessment of impacts and effects

5.5.2 Impacts from the operation of the Proposed Scheme could arise from vehicle emissions due to changes in the volume, composition and distribution of traffic in the area.

5.5.3 A detailed assessment of air quality impacts from traffic emissions in the area will be undertaken and reported in the formal EIA Report.

Other mitigation measures

5.5.4 In the event that significant effects on local air quality are identified from the assessment of traffic emissions during operation of the Proposed Scheme, relevant mitigation measures will be proposed and reported in the formal EIA Report.

Summary of likely residual significant effects

5.5.5 A summary of the likely significant effects on local air quality will be reported in the formal EIA Report.

6 Community

6.1 Introduction

6.1.1 This section of the report describes the impacts and likely significant effects on local communities resulting from the construction and operation of the Proposed Scheme in the South Cheshire area.

6.1.2 Engagement with relevant stakeholders will be undertaken as part of the development of the Proposed Scheme.

6.1.3 Maps showing the location of the key environmental features and the key construction and operation features of the Proposed Scheme can be found in the Volume 2, CA5 Map Book.

6.2 Scope, assumptions and limitations

6.2.1 The assessment scope, key assumptions and limitations for the community assessment are set out in the draft SMR and Volume 1.

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

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

6.3 Environmental baseline

6.3.1 The Proposed Scheme through the South Cheshire area would be approximately 8km in length. The route of the Proposed Scheme, referred to in this report as the HS2 main line, would extend from the boundary with the Whitmore Heath to Madeley area (CA4), south-west of Wrinehill, and travel north towards Crewe. The Proposed Scheme would end to the south of Crewe in a retained cutting (which would connect into a tunnel portal and a tunnel, part of the proposed HS2 Phase 2b).

6.3.2 The area is predominantly rural, made up of a few small settlements with limited community facilities. In general, the majority of community facilities such as GP surgeries, schools and community meeting places, lie within the village centres, with the majority of these facilities found at Wrinehill, Betley, Weston and Shavington, which are outside of the study area. The area is also characterised by small clusters of dwellings and individual dwellings within rural areas close to the Proposed Scheme. Closer to Crewe the area becomes more urban.

6.3.3 Mill Lane Allotments are located to the north-west of Weston village. The allotments are run by Weston Allotment Group, a community organisation, and provide plots for

residents of Weston and Basford. The allotments are also used by local schools for a student gardening club. The site includes 32 plots, a polytunnel and car park.

6.3.4 Three promoted PRoW routes[36] follow the route of Chorlton Footpath 7 as it crosses the WCML to the west of Chorlton. These are:

- Crewe and Nantwich Circular Walk, a 45km route;
- Two Saints Way, a 148km route; and
- The South Cheshire Way, a 55km route.

6.4 Effects arising during construction

Avoidance and mitigation measures

6.4.1 PRoW routes would be maintained and would remain operational wherever reasonably practicable.

Assessment of impacts and effects

Temporary effects

Residential properties

6.4.2 The area required for the realignment of Den Lane (East), the WCML realignment and the Den Lane East viaduct would be adjacent to six residential properties on Den Lane. The properties would be surrounded to the east and west by construction activities associated with the Proposed Scheme. Access to the properties would be maintained via Den Lane, however, this route would be used as a construction traffic route, possibly leading to delays. The possible reduction in accessibility and the presence of construction activities is likely to result in temporary isolation for this group of properties on Den Lane. A major adverse effect has been identified, which would be significant.

Community facilities

6.4.3 No temporary effects on community facilities have been identified as a result of the land required for construction or due to isolation.

Recreational facilities

6.4.4 No temporary effects on recreational facilities have been identified as a result of the land required for construction or due to isolation.

Open space and PRoW

6.4.5 Part of Mill Lane Allotments (approximately 0.2ha) is located within land required for the construction of A500 Shavington Bypass realignment and Crotia Mill Lane realignment. Approximately 25% of the allotment site would be inaccessible to the public during the construction period. The temporary loss of this land at Mill Lane

[36] Promoted PRoW refers to those PRoW which are a "promoted" destination in their own right as a recreational resource.

Allotments would result in a potentially major adverse effect, which would be significant.

6.4.6 Land required for the construction and operation of the Proposed Scheme would result in severance of three promoted PRoW, which are considered to provide a recreational resource. The Proposed Scheme would include permanent and, as required, temporary realignments for each PRoW. The effect on these PRoW would not be significant.

Permanent effects

Residential properties

6.4.7 The construction of the IMD reception tracks, HS2 spurs and WCML realignment over Chorlton Lane would require the demolition of three residential properties on Chorlton Lane. These residential properties would be permanently lost.

6.4.8 The area required for the construction and operation of the IMD reception tracks over Newcastle Road would be adjacent to 10 residential properties on Newcastle Road. The properties would be surrounded on all sides by elements of the Proposed Scheme including: the South Crewe auto-transformer feeder station and South Crewe ATFS main compound; the diverted Chorlton Lane; the IMD access spurs and reception tracks; landscape earthworks; and the realigned Newcastle Road. The existing section of Newcastle Road would be closed and a realigned route would be provided to the north.

6.4.9 Access to properties would be maintained via the existing Newcastle Road. However, this would be permanently closed to the east of the properties and tied in with the realigned Newcastle Road to the west of the properties. The resulting isolation effect of reduced accessibility and being surrounded by elements of the Proposed Scheme is likely to result in permanent isolation for this group of residential properties on Newcastle Road. A major adverse effect has been identified, which would be significant.

6.4.10 The construction of the Proposed Scheme around Weston Lane, including the IMD reception tracks and Basford satellite compound would require the demolition of one residential property on Weston Lane. This residential property would be permanently lost.

6.4.11 The construction of the HS2 Crewe IMD to the north of the A500 Shavington Bypass would require the demolition of residential properties on the Basford West development site accessed from the B5071 Jack Mills Way. The Basford West site[37] is currently under development and as of summer 2016 it is estimated that approximately 40 residential properties are either completed or under construction. These residential properties would be permanently lost. The permanent loss of these properties would result in a major adverse effect, which would be significant.

[37] The effects on the complete Basford West development site will be reported in the formal EIA Report. (If an alternative location for a permanent maintenance facility is selected the Basford West development area would no longer be required and these demolitions would be avoided).

Community facilities

6.4.12 It is currently anticipated that there would be no permanent effects on community facilities as a result of the Proposed Scheme.

Recreational facilities

6.4.13 It is currently anticipated that there would be no permanent effects on recreational facilities as a result of the Proposed Scheme.

Open space and PRoW

6.4.14 Part of Mill Lane Allotments (approximately 0.1ha) is located within land required for the operation of the realigned A500 Shavington Bypass. Approximately 13% of Mill Lane Allotments would be permanently inaccessible to the public due to the presence of the realigned road and hedgerow planting. The permanent loss of approximately 13% of the open space at Mill Lane Allotments would result in a moderate adverse effect, which would be significant.

6.4.15 Land required for the construction and operation of the Proposed Scheme would result in severance of three promoted PRoW, which are considered to provide a recreational resource. The Proposed Scheme would include permanent and, as required, temporary realignments for each PRoW. Therefore, the effect on these PRoW would not be significant.

Other mitigation measures

6.4.16 Other mitigation measures, where required, will be described in the formal EIA Report.

6.4.17 HS2 Ltd will continue to work with CEC to maintain the improvements provided by the B5071 Jack Mills Way, which could include either realigning the B5071 Jack Mills Way or reconfiguring the HS2 Crewe IMD such that the existing road is retained. Changes to the design will be reported in the formal EIA Report.

Summary of likely residual significant effects

6.4.18 There would be a major adverse temporary isolation effect on six residential properties on Den Lane due to the construction activities associated with realignment of Den Lane (Den Lane East), realignment of the WCML and the Den Lane East viaduct.

6.4.19 There would be a major adverse permanent isolation effect on 10 residential properties on Newcastle Road. These properties would be surrounded on all sides by elements of the Proposed Scheme.

6.4.20 Up to 40 residential properties would be demolished at Basford West[37] off the B5071 Jack Mills Way, resulting in a major adverse permanent significant effect.

6.4.21 There would be a major adverse temporary effect on Mill Lane Allotments due to the loss of land for the construction of the Proposed Scheme. This would reduce to a moderate adverse permanent effect during the operation of the Proposed Scheme.

6.5 Effects arising from operation

Avoidance and mitigation measures

6.5.1 No relevant avoidance and mitigation measures have been identified at this time.

Assessment of impacts and effects

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

Other mitigation measures

6.5.3 Specific mitigation measures, where required, will be described in the formal EIA Report.

Summary of likely residual significant effects

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

7 Cultural heritage

7.1 Introduction

7.1.1 This section of the report provides a description of the current baseline for heritage assets and of the likely impacts and significant effects resulting from the construction and operation of the Proposed Scheme within the South Cheshire area. Consideration is given to the extent and heritage value (significance) of assets including archaeological and palaeo-environmental remains; historic buildings and the built environment.

7.1.2 The assessment focusses on the extent to which the Proposed Scheme would affect designated and non-designated heritage assets. Impacts on heritage assets as a result of the Proposed Scheme would occur largely through the physical removal and alteration of heritage assets and changes to their setting.

7.1.3 Maps showing the location of the key environmental features can be found in Volume 2, CA5 Map Book. Only designated heritage assets within the South Cheshire area are shown on maps CT-10-106b to CT-10-111a. Non-designated heritage assets have also been assessed as part of this work, although they are not illustrated on these maps. A gazetteer of designated and non-designated heritage assets with accompanying maps will be included in the formal EIA Report.

7.1.4 Engagement has been undertaken with Historic England and the Cheshire Archaeology Planning Advisory Service with regard to the nature of the cultural heritage assets within the area. The purpose of this engagement has been to understand the local environment, discuss the assessment approach and obtain relevant baseline information. Engagement will continue as part of the development of the Proposed Scheme.

7.2 Scope, assumptions and limitations

7.2.1 The assessment scope, key assumptions and limitations for the cultural heritage assessment are set out in Volume 1 and the draft SMR.

7.2.2 Detailed assessment of the effects on the historic landscape will be considered in the formal EIA Report.

7.2.3 A detailed assessment of all heritage assets, designated and non-designated, has been carried out, within a study area defined as the land required, temporarily or permanently, to construct and operate the Proposed Scheme plus 500m.

7.2.4 The setting of all designated heritage assets up to 2km from the land required, temporarily or permanently, to construct and operate the Proposed Scheme has been considered.

7.2.5 In undertaking the assessment the following limitations were identified:

- the LiDAR[38] data examined covers the majority of the study area although there were some areas for which data was unavailable; and
- due to limited land access and site conditions, not all areas within the study area were available for field survey such as site reconnaissance visits and geophysical survey. This work is ongoing and will be included as part of the formal EIA Report.

7.2.6 Information from other sources of data, including the Historic Environment Record (HER) and local archives, has been used to provide information relating to the potential heritage assets that may be present.

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

7.3 Environmental baseline

7.3.1 Documentary baseline data were collected from a variety of sources in compiling this assessment including:

- Cheshire HER;
- Cheshire Record Office collections;
- historic Ordnance Survey mapping; and
- other published sources.
- In addition to collating this baseline data, the following surveys were undertaken:
- detailed and systematic transcription of remote sensing data including LiDAR and aerial photographs;
- walkover and site reconnaissance from areas of public access. This was undertaken to understand the character and form of heritage assets and the historic landscape; and
- settings assessments of all designated heritage sites within 2km of the Proposed Scheme.

Designated assets

7.3.2 Designated heritage assets are set out below under three categories: those located partially or wholly within the land required, temporarily or permanently, for the construction and operation of the Proposed Scheme; those within 500m of the land required for construction and operation; and those between 500m and 2km away.

[38] Light detection and ranging (LiDAR) is a high resolution remote sensing technique to capture 3D data.

7.3.3 There are no designated heritage assets located partially or wholly within the land required, temporarily or permanently, for the construction of the Proposed Scheme.

7.3.4 The following designated heritage assets are located partially or wholly within 500m of the land required, temporarily or permanently, for the construction and operation of the Proposed Scheme (from south to north):

- Summer House, Wrinehill, Grade II;
- Basford Bridge Cottage, Grade II;
- Signpost, corner of Cemetery Road and Weston Lane, Grade II;
- Shavington Lodge, Grade II; and
- Shavington Hall, Grade II.

7.3.5 The following designated heritage assets are located between 500m and 2km from the land required, temporarily or permanently, for the construction and operation of the Proposed Scheme (from south to north):

- scheduled monument of Hall Bank Moated Site, near Wybunbury;
- Checkley Hall, Grade II*;
- Gate Piers before Checkley Hall, Grade II;
- Hallgates Cottage, Checkley Lane. Grade II;
- Blakenhall Farmhouse, Grade II;
- Boat House, approximately 300 yards east of Doddington Hall, Grade II;
- The Cliffe, south-west of Wybunbury on the Wrinehill Road, Grade II;
- Doddington Hall Registered Park and Garden, Grade II;
- Milepost near the Hand and Trumpet Inn, Betley, Grade I I;
- Ravenshall House, Ravenshall, Betley, Grade II;
- The Steps, Ravenshall, Betley, Grade II;
- The Croft and Prospect House, Ravenshall, Betley, Grade II;
- Betley Court, Dovecote, Forecourt Walls and Gates, Grade II*;
- Betley Old Hall, Grade II*;
- Model Farm Complex, south-west of Betley Old Hall, Grade II*;
- cluster of Grade II buildings lining Betley main road from Wrinehill to Buddleigh;
- Betley, Church of St Margaret, Grade I;
- Lea Hall, Wrinehill Road, Grade II*;
- Beehive Cottages, Back Lane, north of Betley town, Grade II;

- Pigeon House, approximately 15 yards east of Buddleigh Farm, north of Betley town, Grade II;
- Hough Hall, Grade II*, including
  - gates, piers, screen and wall at Hough Gates, Grade II*;
- Hough Manor, Grade II;
- Hollyhedge Farmhouse, north of Weston village and the A500 Shavington Bypass, Grade II*;
- Crewe Hall, Grade I, including:
  - Crewe Park and Garden, Grade II;
  - former stables at Crewe Hall, Grade II*;
- the Church of St Michael, Crewe Green, Grade II*;
- Union Street Baptist Church, Crewe, and attached boundary wall and railings, Grade II;
- Betley Conservation Area and village envelope;
- Weston Conservation Area;
- Wybunbury Conservation Area; and
- Crewe Green Conservation Area.

Non-designated assets

7.3.6 The following non-designated heritage assets are located partially or wholly within the land required, temporarily or permanently, for the construction and operation of the Proposed Scheme:

- Den Bridge and sidings, built for the Grand Junction Railway now part of the WCML;
- extensive medieval and post medieval agricultural landscape with fields, boundaries and holloways[39], surviving in part as earthworks visible in LiDAR data and in part as cropmarks visible on aerial photographs, immediately north of Gonsley Green Farm. This is probably the site of Godewyneslegh, a deserted medieval village (DMV);
- possible moat, south of track to Lane End Farm, recorded in the Cheshire HER;
- railway and embankment cutting, south of Casey Bridge, Grand Junction Railway and early railway heritage associated with Grand Junction Line (opened 1837), including Casey Bridge, Basford Hall Junction and Basford Hall Bridge;

[39] A historic routeway, sunken in relation to surrounding ground-level as the result of use over long periods of time.

- a number of prehistoric findspots located in a 500m radial area on the east side of WCML between Newcastle Road and the A500 Shavington Bypass, recorded in the Cheshire HER;
- The Hall and Mill of Shaw, including features of a moat, watermill and DMV at Basford, south of Weston Lane, recorded in the Cheshire HER;
- Royal Observer Corp Monitoring Post at Shavington, off Casey Lane, recorded in the Cheshire HER;
- the site of Basford Hall and associated surviving farm buildings, immediately north of Weston Lane, visible on historic maps; and
- the site of Crewe Carriage Shed and Basford Hall sorting sidings for the Grand Junction Railway.

7.3.7 The following non-designated heritage assets are located partially or wholly within 500m of the land required, temporarily or permanently, for the construction and operation of the Proposed Scheme:

- incised country lanes of likely medieval origin crossing the landscape east to west (i.e. Wrinehill to Checkley), identified from site visits and visible on historic maps;
- an area of enclosed post-medieval fields near Betley, Blakenhall and Chorlton, identified on historic maps;
- Higher Hayward farmstead, no longer visible in the landscape, located north of Den Lane along track linking Lower Den Farm, recorded in the Cheshire HER;
- Barn at Maltkiln Farm, Wrinehill, recorded in the Cheshire HER;
- Weston Hall Manor House, located to the south of Weston village off the Newcastle Road, recorded in the Cheshire HER;
- Weston Hall Water Mill, located beside the Manor House, recorded in the Cheshire HER;
- prehistoric flint findspot in fields near Burrow Coppice and north of this towards Weston Lane (including a flint scatter), recorded in the Cheshire HER;
- Crotia Mill and pond at Crotia Mill Farm and race, associated with water mill in land west of Heath Farm, recorded in the Cheshire HER;
- Roman coin hoard findspot in land north of Cemetery Road, Weston, recorded in the Cheshire HER;
- possible moat site at Shavington House and earthworks to north of Shavington House, recorded in the Cheshire HER;
- searchlight battery at Willaston, including air raid shelter and Stanton shelter, west of Greenbank Farm, recorded in the Cheshire HER;
- Gresty Green Farm, located west of Gresty Green Road, Crewe, recorded in the Cheshire HER;

- Yew Tree Farm, Crewe Road, Shavington, locally listed building, recorded in the Cheshire HER;
- North Western Mills, industrial site, 189-197 Gresty Road, recorded in the Cheshire HER;
- YMCA Hostel, 189-197 Gresty Road, located on site of North Western Mills, locally listed building, recorded in the Cheshire HER; and
- WWII anti-aircraft battery at Weston Lane Farm recorded in the Cheshire HER.

Cultural heritage overview

7.3.8 There is very little recorded archaeological evidence from the Palaeolithic period within the study area. This is due in large part to the climatic conditions from that period and the superficial (drift) geology and the depositional processes that formed as a result. The Proposed Scheme would pass through a wetland area characterised by mire deposits forming on poorly draining basins, and known as meres and mosses. Examples of these are found with place names such as Betley Mere and Blakenhall Moss. These usually contain depths of peat deposits, and preservation of organic material within the peat could be high. The earliest evidence of human occupation in Cheshire dates to the Mesolithic period, although most of the evidence for such activity is confined to the Pennine fringes in the eastern part of the county, at a considerable distance from the Proposed Scheme. Undated flint tool scatters have been recorded around Weston to the north of the South Cheshire area. A Bronze Age Axe has been found west of Blakenhall.

7.3.9 It is during the Middle Bronze Age through to the later Iron Age that evidence for agricultural practices and land division becomes more visible in the archaeological record, however, this evidence has not been identified in the lowlands area of the Cheshire Plain. More widely, the town of Crewe and its environs are located within the territory believed to have been occupied by the Cornovii tribe during the later Iron Age. Evidence from the East Cheshire region includes Iron Age pottery of a type closely associated with the salt industry and demonstrates that salt was being traded during this period and that trackways and routes between Nantwich, Middlewich and Northwich were well established.

7.3.10 There is very little evidence for Roman activity in the study area although the Roman occupation has been well documented in Cheshire often in association with salt production at sites such as Nantwich and Middlewich. There is some evidence for Roman material, coins and artefacts near Doddington to the west of the Proposed Scheme and Heath Farm and Weston to the north-east. There is evidence for continuing Romano-British salt production and trade in this area.

7.3.11 During the Anglo-Saxon period the area fell within the Kingdom of Mercia, although sites of rural occupation during this period are scarce. Documentary evidence is based mainly on place names and evidence recorded in the Domesday Book and provides evidence of the developing settlement pattern of the region. The suffix 'ton', as in Shavington and Weston, suggests Saxon settlement was established by the end of the 8th century. Betley is derived from a Saxon female name, Bette, and 'ley', meaning clearing in the woods. Basford is recorded in the Domesday Survey as 'Berchesford' and, prior to the Conquest, it comprised three manors held individually by Owen,

Erechaiin and Leofric. Blakenhall is recorded as consisting of six households, with five ploughlands and land for two plough teams.

7.3.12 The rural landscape of Cheshire during the medieval period would have been occupied by a series of small nucleated villages surrounded by open fields[40], including a three-field system near Wybunbury. Several settlements have since disappeared from the landscape, including Godewyneslegh. Historically, the key transport route close to the Proposed Scheme followed the line of Newcastle Road, which connects Newcastle under Lyme with Betley and north towards what is today Crewe. Betley would likely have formed a link to wider economy of this pastoral landscape. In the most part local field systems seem to reflect one or two town fields. During the post-medieval period, the enclosure of the landscape influenced the continuation of settlement growth. Various industries are notable during this time period, including iron works and forges (e.g. at Wrinehill to the south).

7.3.13 The post-medieval period, and in particular the Tudor and Stuart periods, saw major changes in the development of small manorial estates. Most important prior to the Industrial Revolution would have been the enclosure of the medieval open field system, with only vestiges of the former open arable fields of the county surviving by the early 19th century. There is some evidence of medieval field systems surviving near Basford. Commercial peat production, which began in the late 19th century in Cheshire and agricultural improvements effected changes to the wetlands in the region. To the north, villages such as Weston and Basford have probably remained largely unaltered in their general layout from the end of the medieval period until the late 20th and early 21st centuries.

7.3.14 The present town of Crewe came into being with the construction of the Grand Junction Railway's Birmingham to Warrington line in 1837. During the 20th century a number of sites around Crewe railway, Weston and Basford were used during WWII as cold stores, anti-aircraft batteries, and Prisoner of War camps.

7.4 Effects arising during construction

Avoidance and mitigation measures

7.4.1 The draft CoCP sets out the measures that would be adopted to control effects on cultural heritage assets. These provisions include the following:

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

[40] The typical medieval pattern of cultivation under which each village had two or three large fields divided into strips, each of which was cultivated by individual householders

7.4.2 The design of the Proposed Scheme seeks to reduce impacts on heritage assets within the South Cheshire area by the following measures:

- avoidance of the loss of or physical impacts to any designated built heritage, scheduled monuments, registered parks or gardens, registered battlefields or listed buildings; and
- the alignment avoids the Betley and Weston conservation areas, and seeks to avoid setting impacts on the built heritage assets they contain.

Assessment of impacts and effects

7.4.3 Impacts on all heritage baseline assets described above have been assessed. However, only those leading to significant effects are described in the construction assessment set out below.

Temporary effects

7.4.4 Impacts would occur to heritage assets within the land required for the construction of the Proposed Scheme. In addition, the setting of heritage assets in the wider study area may be affected due to the visibility of plant, cranes and equipment, or the presence of other construction elements. The duration of construction impacts has yet to be confirmed and will be reported in the formal EIA Report.

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

7.4.6 The significance of the Grade II Listed Shavington Hall relates to its rural context and historic relationship with the surrounding agrarian landscape. Visual intrusion and noise associated with construction activities relating to the realignment of the A500 Shavington Bypass and the HS2 Crewe IMD would adversely affect these relationships. This is an asset of moderate value, with construction activities constituting a medium impact and a moderate effect.

Permanent effects

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

7.4.8 Replacement of the Den Lane (WCML) overbridge and earthworks in proximity to the adjacent sidings would have a high impact on the historic Den Bridge and sidings, an asset of low value. This would result in a high impact and moderate adverse effect.

7.4.9 Construction activities associated with the route of the Proposed Scheme, including construction of the new section of the WCML, the HS2 Crewe IMD reception tracks and associated infrastructure would remove surviving earthwork and buried archaeological features in the area of Godwyneslegh DMV, an asset of moderate value, which would constitute a high impact and major adverse effect.

7.4.10 Construction activities associated with northbound part of the WCML landscape mitigation and closure of Chorlton Lane would remove any buried remains of a moated site recorded in the Cheshire HER, located east and adjacent to the existing WCML and south of the Chorlton Lane leading to Lane End Farm. The moated site is

an asset of moderate value. This would constitute a high impact and a major adverse effect.

7.4.11 Construction activities associated with the new section of WCML, including the realignment of the A500 Newcastle Road and construction of new overbridge, would affect the surviving Grand Junction Railway embankment and cutting located south of Casey Bridge where the proposed overbridge would cross. This is an asset of low value. The Proposed Scheme would constitute a high impact and moderate adverse effect.

7.4.12 Construction activities associated with the Proposed Scheme and works associated with the connection to the northern part of the WCML, specifically the overbridge on Weston Lane, are likely to remove buried remains associated with the former Basford Hall and non-designated farm buildings, assets of low value. This would constitute a high impact and a moderate adverse effect.

7.4.13 Construction activities associated with the Proposed Scheme, and connection to the northern part of the WCML, specifically the closure of Weston Lane and its realignment south, are likely to remove buried remains associated with the Hall and Mill of Shaw and Basford Hall possible DMV, an asset of moderate value. This will constitute a high impact and a major adverse effect.

7.4.14 Construction activities for the new section of WCML, including the closure of Casey Lane and the Weston Lane realignment, would affect early railway heritage associated with Casey Bridge, Basford Hall Junction and signal box, Basford Hall Bridge, assets of moderate value, which would constitute high impacts and major adverse effects.

7.4.15 The following significant effects would occur as a result of permanent impact on the setting of designated or non-designated heritage assets.

7.4.16 Basford Bridge Cottage, a Grade II listed building of moderate value. The agrarian surroundings of this 18th century cottage, its relationship to nearby farm buildings and the local villages via Newcastle Road on which it sits, are all important elements of its setting. The closure of Newcastle Road immediately to the south will change these aspects of its setting. This would constitute a medium impact and a moderate adverse effect.

7.4.17 The most important elements of the setting of Grade II listed Shavington Hall, a listed building of moderate value, are Weston Lane to the south, the long drive connecting from the lane to the hall, and the surrounding fields of pasture. Despite the proximity of the modern town of Shavington and the A500 Shavington Bypass it remains an essentially rural setting. This will be subject to a change from the realignment of the A500 Shavington Bypass, moving closer (to the south) in combination with the HS2 Crewe IMD, with its associated enhanced lighting effects. This will constitute a medium impact and moderate adverse effect.

Other mitigation measures

7.4.18 Refinements to the mitigation measures incorporated into the design of the Proposed Scheme and the draft CoCP will continue to be made through the development of the design to seek to reduce further the significant effects described above. These refinements will include the identification of:

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

Summary of likely residual significant effects

7.4.19 The temporary effects of construction activity on the setting of heritage assets are largely reversible in nature and last for the duration of construction. The physical impacts of construction on heritage assets are permanent and not reversible where heritage assets would be removed. This would result in significant effects on the archaeological remains of medieval settlement at Godwyneslegh and Basford Hall, historic farm buildings at Basford Hall, the Hall and Mill of Shaw, a moated site near a road leading to Lane End Farm, and the historic railway fabric, including Den Bridge and Sidings, Grand Junction Railway embankment and cutting, Casey Bridge, Basford Hall Junction and signal box. There would also be permanent residual effects on the setting of Basford Bridge Cottage and Shavington Hall, both of which are Grade II listed building, because of the presence of the Proposed Scheme.

7.5 Effects arising during operation

Avoidance and mitigation measures

7.5.1 The following measures, as shown on the CT-06 maps within the Volume 2, CA5 Map Book, have been incorporated into the design of the Proposed Scheme to reduce the impacts and effects on heritage assets:

- noise mitigation measures (i.e. including noise barriers) to reduce potential impacts on identified assets; and
- landscape planting would, over time, reduce impacts on the setting of the designated assets within the study area.

Assessment of impacts and effects

7.5.2 There will be no significant effects on heritage assets as a result of operational impacts from the Proposed Scheme. This is a reflection of the proximity of the existing WCML, which means that heritage assets along the route already experience noise and movement impacts from the existing railway. The additional effect of the Proposed Scheme on heritage assets such as Basford Bridge Cottage and Shavington Hall is therefore not considered to be significant.

Other mitigation measures

7.5.3 The Proposed Scheme includes a number of design measures to address potential impacts and significant effects. No additional operational mitigation measures beyond those included within the Proposed Scheme design have been identified at the current time although potential opportunities for further mitigation will continue to be considered through the design process.

Summary of likely residual significant effects

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

8 Ecology and biodiversity

8.1 Introduction

8.1.1 This section of the report provides a summary of the predicted impacts and significant effects upon species and habitats in the South Cheshire area as a consequence of the construction and operation of the Proposed Scheme. This includes effects upon sites recognised or designated on the basis of their importance for nature conservation.

8.1.2 Engagement with stakeholders including Natural England, Environment Agency, Forestry Commission, Cheshire Wildlife Trust, Royal Society for the Protection of Birds, Woodland Trust, CEC and landowners has been undertaken. The purpose of this engagement has been to discuss the Proposed Scheme and potential effects, and/or obtain relevant baseline information and consider alternative locations for environmental mitigation. Engagement with these stakeholders and other local groups will continue as part of the development of the Proposed Scheme.

8.1.3 Maps showing the location of the key environmental features and the key construction and operation features of the Proposed Scheme can be found in the Volume 2, CA5 Map Book.

8.2 Scope, assumptions and limitations

8.2.1 The scope, methodology and key assumptions for the ecological assessment are set out in the draft SMR and Volume 1. The assessment methodology is summarised in Section 8 of Volume 1, along with route-wide assumptions and limitations. In the absence of field surveys and fully developed mitigation, the assessment has been undertaken on a precautionary basis.

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

8.3 Environmental baseline

Existing baseline

Introduction

8.3.1 This section presents the environmental baseline that is relevant to the consideration of impacts and effects reported in sections 8.4 and 8.5.

8.3.2 Land in and adjacent to the Proposed Scheme in the South Cheshire area consists mainly of agricultural land, intact and species-rich hedgerows, floodplain, and the WCML. Checkley Brook, Gresty Brook and the River Lea intersect with the route of the Proposed Scheme, as well as a number of minor watercourses, ponds and ditches. There are four broadleaved woodlands within the area required for the Proposed Scheme.

8.3.3 Statutory and non-statutory designated sites are shown on the CT-10 Map Series, Volume 2, CA5 Map Book.

8.3.4 There are no internationally or nationally designated sites that would be affected by the Proposed Scheme in this area. The nearest site, which is over 200m to the east, is the Betley Mere Site of Special Scientific Interest (SSSI), which forms part of the Midland Meres and Mosses Phase 1 Ramsar Site. Betley Mere SSSI contributes to a nationally important series of open water and peatland sites. Among the series of meres, Betley Mere SSSI is particularly noted due to its diversity of plant communities. The Ramsar Site supports rare species of plants associated with wetlands, such as elongated sedge, six-stamened waterwort, needle spike-rush, and cowbane and marsh fern.

8.3.5 Basford Brook and Mere Gutter Local Wildlife Site (LWS) is partially located within the land required for construction of the Proposed Scheme. This LWS is listed as one of three key sites for white-clawed crayfish in Cheshire and a 'Local Key Area'[41] for water vole. Due to the habitats and species present, these sites are considered to be up to county/metropolitan value.

8.3.6 There are no Ancient Woodland Inventory Sites (AWIS) within 500m of the Proposed Scheme. A review of woodlands not currently listed on the Ancient Woodland Inventory (AWI), but that are either within the land required for construction of the Proposed Scheme or within 500m of it, has been undertaken. The review did not consider that any of the woodlands present were likely to be potential ancient woodland in this area.

8.3.7 There are six areas of woodland (which may qualify as habitats of principal importance and local Biodiversity Action Plan (BAP[42]) habitats), which are within or partly within the land that would be required for construction of the Proposed Scheme. These are areas of semi-natural deciduous woodland located north of Checkley Lane, south of Newcastle Road, and four areas alongside the WCML on the southern side of Crewe. On a precautionary basis, pending the findings of field surveys, each of these woodlands are considered to be of up to district/borough value.

8.3.8 Watercourses that are relevant to the assessment include the River Lea, Checkley Brook and Gresty Brook, and several smaller watercourses, which would be crossed by the Proposed Scheme. These watercourses may qualify as habitats of principal importance and local BAP habitats, and on a precautionary basis, in the absence of survey information, are considered to be of up to county/metropolitan value. These require compliance assessment under the Water Framework Directive (WFD)[43] and relevant surveys, such as fish, invertebrate and invasive plant species, will be undertaken.

8.3.9 There are 69 existing ponds within, or partly within, the land that would be required for construction of the Proposed Scheme. It is assumed that all ponds are of district/borough value unless they are found to be habitats of principal importance[44],

[41] National Watervole Steering Group (2013); 'Likely Key Areas to support water vole'.
[42] Cheshire Biodiversity Action Plan (BAP).
[43] EU Water Framework Directive http://ec.europa.eu/environemt/water/water-framework/index_en.html
[44] Section (41) of the National Environment and Rural Communities Act 2007.

or local BAP habitats, in which case, on a precautionary basis, they would be assumed to be of up to county/metropolitan value.

8.3.10 Many of the hedgerows in the area are likely to qualify as a habitat of principal importance and a local BAP habitat. Some may also meet the wildlife and landscape criteria to be 'Important hedgerows' as defined in the Hedgerows Regulations 1997[45]. In addition they could also provide commuting corridors for wildlife and nesting and feeding habitat. On a precautionary basis, in the absence of surveys, the hedgerow network is considered to be of up to district/borough value.

8.3.11 Grasslands are present within the land that would be required for construction of the Proposed Scheme. On a precautionary basis, these grasslands may qualify as a habitat of principal importance and local BAP habitat. Unless the field surveys identify unimproved grasslands, these grasslands are considered to be of up to district/borough value.

8.3.12 A summary of the likely value of protected and/or notable species of relevance to the assessment (excluding any features of species interest for which the sites described above are designated) is provided in Table 4.

Table 4: Species potentially relevant to the assessment within the South Cheshire area

Resource/feature	Value	Rationale
Bats	Up to county/metropolitan for the majority of bat species, with potential for up to regional for some rarer species	There are no records of confirmed bat roosts within 2km of the Proposed Scheme. Bats recorded in the land required for construction of the Proposed Scheme include brown long-eared bat, pipistrelle species, and Daubenton's bat.
Otter and water vole	Up to county/metropolitan	Populations of otter are rare in Cheshire. Habitat suitable for this species is present along the watercourses and drainage ditches, and there are records of their presence along the Mere Gutter and Basford Brook LWS. A record for otter tracks was noted within 100m of land that would be required for the construction of the Proposed Scheme. Populations of water vole are rare in Cheshire and declining. Habitat suitable for water vole is present along the watercourses and drainage ditches, and there are seven records within 2km of the Proposed Scheme. There are no records within 100m of land required for the construction of the Proposed Scheme. In addition, there are water vole local key areas present within the area of land that would be required for construction of the Proposed Scheme.
Hazel dormouse	Up to county/metropolitan	Populations of hazel dormice are rare in Cheshire. There are no previous records for the South Cheshire area, and there is little habitat suitable for this species.
Polecat	Up to county/metropolitan	Populations of polecat are rare in Cheshire. Habitat suitable for this species is present including hedgerows,

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

Resource/feature	Value	Rationale
		farmland and woodland, and there are anecdotal records of presence within this area.
Great crested newt	Up to county/metropolitan	There are records of great crested newt within the vicinity of the land that would be required for the construction of the Proposed Scheme with the majority of records close to Crewe.
Birds	Up to county/metropolitan	Birds associated with farmland that are present in the area include lapwing, barn owl, skylark, tree sparrow, yellow wagtail, linnet and yellowhammer. The woodlands are likely to support a range of common woodland species.
White-clawed crayfish	Up to county/metropolitan	There are three records of white-clawed crayfish within the land required for the construction of the Proposed Scheme along Basford Brook and Mere Gutter.
Aquatic and terrestrial invertebrates	Up to district/borough	Aquatic invertebrates could be present in watercourses including Checkley Brook, the River Lea, Gresty Brook, smaller watercourses, and in waterbodies due to the presence of suitable habitat that will support invertebrates.
Fish	Up to district/borough	There are records of European bullhead (which is listed on Annex II of the Habitats Directive[46]) in the sections of the River Lea affected by the Proposed Scheme.
Reptiles	Up to district/borough	There are no records of reptiles within 2km of the land required for the construction of the Proposed Scheme, but there is likely to be habitat suitable for common reptiles, including grass snake near Mere Gutter, Basford Brook and Checkley Brook, and common lizard and slow worm in grassland and scrub habitats.
Badger	Up to local/parish	Badgers are widespread and common. There are records of badger south of Crewe. At least three records of badger activity are within the land required for the construction of the Proposed Scheme.

8.4 Effects arising during construction

Avoidance and mitigation measures

8.4.1 The following measures have been included as part of the design of the Proposed Scheme:

- landscape planting along the route shown on the CT-06 Map Series, Volume 2, CA5 Map Book, which would be largely a mixture of woodland, scrub and

[46] The EC Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (http://eur-lex.europa.eu/eli/dir/1992/43/2013-07-01).

grassland, and would contribute towards offsetting the losses of habitat and effects on species;

- construction of a viaduct over Checkley Brook and the River Lea would avoid direct effects to these watercourses and loss of habitat along the river corridor and allow free passage for wildlife beneath them including along the rivers and their banks;
- new woodland planting would help to offset the loss of semi-natural broadleaved woodland (for example, woodland north of Checkley Lane, south of Newcastle Road and around the WCML near Crewe) and to enhance ecological connectivity;
- provision of new ponds for those lost if they support great crested newts (for example, near Checkley Lane, Blakenhall South, near Den Lane, Chorlton Lane, Newcastle Road and the A500 Newcastle Road/Shavington Bypass), which would form part of the mitigation measures for great crested newts;
- provision of new species-rich hedgerows, using appropriate native species, to help to offset the loss of hedgerows, and to re-connect the ecological network in the surrounding areas, including along the margins of the route of the Proposed Scheme, along road realignments and diversions, and in specific areas such as Checkley Lane and around balancing ponds; and
- provision of new grassland habitats, including species-rich grasslands to help offset the loss from the Proposed Scheme.

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

Assessment of impacts and effects

8.4.3 The following section considers the impacts and effects on ecological features as a consequence of construction of the Proposed Scheme. All assessments are on a precautionary basis in the absence of survey information and take account of the baseline value as presented in Section 8.3 of this report.

8.4.4 Midlands Meres and Mosses Phase 1 Ramsar Site (Betley Mere SSSI component) is over 200m to the east of the Proposed Scheme. A Habitats Regulations Assessment (HRA) was undertaken for Midland Meres and Mosses Phase 1 Ramsar site (HS2, 2012[47]). The HRA concluded that Proposed Scheme would not be likely to cause a significant effect on the Betley Mere site.

8.4.5 The Newcastle Road realignment, Casey Lane diversion and A500 Shavington Bypass realignment would result in the loss of approximately 1ha (10%) of the habitat surrounding the brook within Basford Brook and Mere Gutter LWS and would potentially cause a significant loss of riparian habitat that would result in an effect on integrity that would be significant at up to county/metropolitan level.

[47] HS2 (2012). *HRA Screening Report for Midland Meres and Mosses Phase 1 Ramsar Site.*

8.4.6 Construction of the HS2 main line, along with the HS2 spurs, would result in the loss of approximately 11ha of semi-natural deciduous woodland and 5ha of broadleaved plantation woodland (approximately 16ha total). The permanent loss of semi-natural woodland would result in an effect that would be significant at up to the district/borough level.

8.4.7 The design includes the Checkley Brook viaduct that would carry the route of the Proposed Scheme across Checkley Brook and the River Lea. These watercourses would not be directly affected, and indirect effects would not be significant as they would be controlled through the implementation of measures in the draft CoCP. However, the Proposed Scheme would result in the loss of sections of other smaller watercourses and severance of river corridors due to culverts and siphons, which would result in a permanent effect that would be significant at up to the district/borough level.

8.4.8 Sixty-nine ponds would be lost due to the Proposed Scheme. The loss of these ponds could result in an impact that would be significant at up to county/metropolitan level depending on the findings of field surveys (for example, if they support great crested newts), otherwise up to district/borough level.

8.4.9 The Proposed Scheme would cross approximately 125 hedgerows that are located throughout the area, some of which may be 'Important hedgerows'. The land that would be required for construction of the Proposed Scheme would result in the permanent loss of approximately 23km of hedgerows, and would result in severance of the network in many places, adversely affecting connectivity with the surrounding area. The Proposed Scheme includes areas of new hedgerow planting, which would help offset losses. In the absence of this additional mitigation, the impact would result in a permanent adverse effect on the conservation status of the hedgerow network that would be significant at up to the district/borough level.

8.4.10 The Proposed Scheme would result in the loss of grassland. In the absence of field survey information, it has been assumed that none of the grassland lost would be unimproved, and hence the loss would be significant at up to the district/borough level.

8.4.11 Habitat loss may have impacts on bats as it would reduce the availability of foraging resource, and potentially result in the loss of roosts and fragmentation of commuting routes. This could particularly affect breeding populations of bat species within the area. Bats may also be affected by the lighting associated with construction works, although it is anticipated that this would be controlled through measures in the draft CoCP. On a precautionary basis, in the absence of mitigation, there could be impacts on significant populations of bats which may be up to regional level. However, the majority of impacts on bats would be expected to be up to county/metropolitan level.

8.4.12 Otters and water voles have been recorded along the Basford Brook and Mere Gutter LWS, which is partially within land required for the construction of the Proposed Scheme, and the loss of habitat adjacent to the brook. There would be additional loss of habitat from several smaller watercourses where these would be crossed by the Proposed Scheme. On a precautionary basis in the absence of survey information, impacts on otters and water voles would result in an adverse effect on the

conservation status of these species that would be significant up to the county/metropolitan level.

8.4.13 Indirect effects from construction activities such as increased light and noise may result in disturbance to these species during the construction period, and prevent them from moving along the watercourses. However, it is anticipated that such indirect effects would be controlled through measures in the draft CoCP.

8.4.14 The loss of deciduous woodland and hedgerows could affect hazel dormouse if this species is found to be present. The loss of these habitats along with grassland and arable land could also affect polecat, a species that has been recorded in the area. On a precautionary basis in the absence of survey information, the effects of permanent habitat loss on these mammals are assumed to be of up to county/metropolitan significance.

8.4.15 On a precautionary basis, it is assumed that all 69 ponds (and surrounding terrestrial habitat) within the land required for construction of the Proposed Scheme support great crested newts. The loss of ponds supporting great crested newts could result in the isolation and severance of breeding populations of great crested newts across this area. The design incorporates the creation of some new ponds, but additional ponds would also be required subject to the outcome of surveys. Suitable terrestrial habitat would also be required to fully mitigate the effects. In the absence of the full mitigation, the loss of the ponds and surrounding land would result in a permanent adverse effect on the conservation status of great crested newts that would be significant at up to the county/metropolitan level.

8.4.16 The Proposed Scheme would result in the loss of nesting and foraging habitat for a range of farmland and woodland birds. These are likely to include barn owl, due to the suitable habitats present. On a precautionary basis, in the absence of survey information, it has been assumed that the loss of nesting and foraging habitat would result in a permanent adverse effect that would be significant at up to the county/metropolitan level.

8.4.17 The Proposed Scheme would pass over and adjacent to Basford Brook and Mere Gutter LWS, which could directly impact white-clawed crayfish. On a precautionary basis in the absence of survey information, it has been assumed that the Proposed Scheme would result in a permanent adverse effect on white-clawed crayfish that would be significant at up to the county/metropolitan level.

8.4.18 The land that would be required for construction of the Proposed Scheme would result in loss of habitat suitable for aquatic and terrestrial invertebrates (including Section 41 species). On a precautionary basis in the absence of survey information, it has been assumed that the loss of habitat would result in a permanent adverse effect that would be significant at up to the district/borough level.

8.4.19 The Proposed Scheme would pass over main watercourses such as the River Lea, Checkley Brook on the Checkley Brook viaduct, and indirect impacts to fish living in the watercourses would be controlled through measures set out in the draft CoCP and will be assessed for compliance with the WFD. However, other smaller watercourses would still be affected and may require assessment under the WFD. On a precautionary basis in the absence of survey information, it has been assumed that

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

8.4.20 The Proposed Scheme would result in the loss of habitat suitable for common reptiles, such as grassland and scrub and there would be a large amount of habitat loss that may support common reptiles. On a precautionary basis in the absence of survey information, it has been assumed that the loss of habitat would result in a permanent adverse effect that would be significant at up to district/borough level.

8.4.21 Effects on all other habitats and species would likely be significant at the local/parish level during construction. These effects and consideration of the potential cumulative effects will be described in the formal EIA Report.

8.4.22 Indirect effects from changes in air quality, such as that arising from increased levels of construction traffic, will be considered for sites within 200m of construction routes where habitats are considered to be sensitive to air quality changes. These effects will be reported in the formal EIA Report.

Other mitigation measures

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

- provision of additional broadleaved woodland to replace those lost, and/or enhancement of remaining woodlands;
- provision of additional hedgerows, which would offset the losses and maintain the connectivity of the network;
- options to create new species-rich grasslands (including translocation where appropriate) to offset grassland losses, and to offset losses of improved grassland;
- provision of additional measures to facilitate connectivity where significant foraging or commuting routes of fauna species would be affected;
- use of temporary fencing or retention of existing habitat links to reduce the risk of disturbance to otters during construction;
- design of watercourse culverts and underpasses to allow the free passage of wildlife;
- provision of alternative roosting habitat for bats; and
- provision of additional ponds and suitable terrestrial habitat around these ponds with habitat links to allow dispersal.

8.4.24 Some of the above may also be achieved through strategic mitigation in locations outside of the land required for the Proposed Scheme, which are currently being discussed with relevant stakeholders and are subject to agreement.

Summary of likely residual significant effects

8.4.25 Taking into account mitigation proposed in the design of the Proposed Scheme set out above, anticipated significant residual ecological effects during construction are detailed in Table 5.

Table 5: Anticipated significant residual ecological effects during construction

Resource/feature	Residual effect	Level at which the effect would be significant
Basford Brook and Mere Gutter LWS	Permanent adverse effect on site integrity due to loss of approximately 1ha (10%) of riparian habitat.	County/metropolitan
Semi-natural woodland	Permanent loss of approximately 11ha of woodland.	Up to district/borough.
Watercourses	Permanent adverse effect to the smaller watercourses, due to habitat loss and severance of the river corridors.	Up to district/borough
Ponds	Permanent loss of 69 ponds.	Up to county/metropolitan
Hedgerows	Permanent loss of approximately 23km of hedgerows. Adverse effects on connectivity with the wider area.	Up to district/borough
Grassland	Permanent loss of grassland outside of designated sites.	Up to district/borough
Bats	Potential permanent adverse effect on conservation status due to loss of roosts (including maternity roosts), foraging habitat and fragmentation.	Up to regional for some species
Otter and water vole	Potential adverse effect due to construction activities and disturbance along main rivers. Loss of habitat and habitat fragmentation on smaller watercourses.	Up to county/metropolitan
Hazel dormouse	Loss of habitat suitable for hazel dormouse.	Up to county/metropolitan
Polecat	Loss of habitat suitable for polecat.	Up to county/metropolitan
Great crested newts	Loss of 69 ponds and surrounding terrestrial habitat which may support great crested newts.	Up to county/metropolitan
Birds	Loss of nesting and foraging habitat for a range of birds, especially of farmland and	Up to county/metropolitan

Resource/feature	Residual effect	Level at which the effect would be significant
	woodland. Barn owl, a Schedule 1 species[48], may be affected.	
White-clawed crayfish	Permanent loss of habitat suitable for white-clawed crayfish.	Up to county/metropolitan
Aquatic and terrestrial invertebrates	Permanent loss of suitable habitat.	Up to district/borough
Fish	Permanent loss of habitat from smaller watercourses.	Up to district/borough
Reptiles	Permanent loss of habitat suitable for reptiles.	Up to district/borough

8.5 Effects arising from operation

Avoidance and mitigation measures

8.5.1 Within this section of the Proposed Scheme the following elements of the design would avoid or reduce impacts on features of ecological value during operation. Construction of viaducts over the River Lea and Checkley Brook would avoid direct effects to these watercourses and allow free passage for wildlife beneath them including along the rivers and their banks.

Assessment of impacts and effects

8.5.2 The following section considers the impacts and effects on ecological features during operation of the Proposed Scheme. All assessments are made on a precautionary basis in the absence of survey information, and take account of the baseline value presented in Section 8.3 of this report.

8.5.3 Bats are at risk of mortality from passing trains, particularly at frequently used commuting/foraging routes across the Proposed Scheme. On a precautionary basis in the absence of mitigation there could be significant impacts on populations of bats, which may be up to regional level. However, the majority of impacts on bats would be expected to be at a lower level.

8.5.4 Barn owls are at risk of colliding with trains, particularly near Checkley Brook, the River Lea and Gresty Brook, where there is suitable grassland foraging habitat. Barn owls are slow moving and often hunt low over rough grassland habitats that occur along road and railway corridors. As a result they may be killed by cars and trains. Mortality could affect the conservation status of this Schedule 1 species and the ongoing reduction in numbers would result in a permanent adverse effect that would be significant at up to county/metropolitan level.

[48] [1]The Wildlife and Countryside Act 1981 (1981 Chapter 69) – Schedule 1 – Birds which are Protected by Special penalties, HMSO London, Available online at: http://www.legislation.gov.uk/ukpga/1981/69

8.5.5 Effects on all other habitats and species would be likely to be significant at the local/parish level during operation. These effects and consideration of the potential cumulative effects will be described in the formal EIA Report.

Other mitigation measures

8.5.6 Additional mitigation measures currently being considered include:

- the development of a barn owl action plan to provide off-site mitigation to reduce the likelihood of barn owls foraging in proximity to the route of the Proposed Scheme (informed by dispersion modelling being undertaken for HS2 Ltd by the British Trust for Ornithology (BTO)); and
- green bridges, culverts, and underpasses, as required, to reduce the likelihood of bat mortality at key locations.

Summary of likely residual significant effects

8.5.7 Taking into account mitigation included as part of the Proposed Scheme design, the anticipated significant residual ecological effects during operation are detailed in Table 6.

Table 6: Residual significant effects on ecological resources/features during operation

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

9 Health

9.1 Introduction

9.1.1 This section identifies the communities within the South Cheshire area that would be subject to impacts from the Proposed Scheme and describes how the changes may affect the health and wellbeing of people within these communities.

9.1.2 Maps showing the location of the key environmental features and the key construction and operation features of the Proposed Scheme can be found in the Volume 2, CA5 Map Book.

9.1.3 A socio-economic model of health is adopted for this assessment in which the health status of a population, or changes to the health status, is attributed to a series of health determinants. An individual's health may be determined by genetics and lifestyle factors, but for a large enough population many other factors are known to be important and these factors may be affected by the Proposed Scheme.

9.1.4 No engagement has been undertaken with key public health bodies to date. Engagement with key public health bodies will be undertaken as part of the development of the Proposed Scheme. The purpose of the engagement will be to increase the understanding of health issues that may not be identified solely through a review of publicly available data.

9.2 Scope, assumptions and limitations

9.2.1 The scope, assumptions and limitations for the health assessment are set out in Volume 1 and the draft SMR.

9.2.2 This section deals specifically with impacts that occur at a local level within the South Cheshire area. Health effects across the Proposed Scheme as a whole are assessed in the route-wide health assessment contained in Volume 3. The health determinants of relevance within this community area are:

- social capital;
- neighbourhood quality;
- access to green space, recreation and physical activity; and
- access to services.

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

9.2.4 The health assessment is based on a review of evidence linking changes in health determinants to potential health outcomes. This information will be presented in a literature review and included in the formal EIA Report. The evidence that relates health outcomes to changes in determinants varies in its strength. For example, the evidence relating to health effects of physical activity is strong, whereas that relating to social capital is considered weak. The strength of evidence does not necessarily determine the importance of the health effect in the assessment.

9.2.5 The certainty that can be attached to any conclusion regarding effects on health will depend on the strength of the evidence for a given determinant and also the confidence attached to the prediction of an impact on a determinant. There will be greater certainty for the existence of an impact than a consequent effect on health.

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

9.3 Environmental baseline

9.3.1 The southern section of the South Cheshire area has a relatively small population while the northern section close to Crewe is more densely populated. Data provided by the Office of National Statistics[49] and the Association of Public Health Observatories (APHO)[50] show that the population across the three wards[51] in the southern section of the South Cheshire area – Wybunbury, Shavington and Haslington – is, by comparison with national (England) averages, in good health and experiences low levels of deprivation. This contrasts with the two wards in the northern section of the South Cheshire area, Crewe South and Crewe East, which have higher levels of deprivation and a lower standard of health compared with national figures.

9.3.2 The population in the southern section is considered to be generally more resilient than the national average with regard to changes in the relevant health determinants, and with relatively few vulnerabilities. One such vulnerability is a slightly higher than average proportion of older people (the 65 to 84 years category) across the area. In contrast, Crewe South and Crewe East have as much as 40% of their population in the lowest social grade 'DE' category and fall into the 10% most deprived wards nationally for health and disability deprivation. Crewe East has a relatively high proportion of households that have one or more people with a long-term health problem or disability.

9.3.3 The available data permits a profile to be made of the whole population in the South Cheshire area and provides detail down to ward level. The description of the whole population and the populations within wards does not exclude the possibility that there will be some individuals or small groups of people who do not conform to the overall profile. Stakeholder engagement will be undertaken and this will provide further information of relevance to the community profile.

9.4 Effects arising during construction

Avoidance and mitigation measures

9.4.1 Consideration of potential health issues is an integral part of the planning and design of the Proposed Scheme, alongside consideration of other environmental, community and economic issues. Adverse impacts on health determinants have been reduced as far as reasonably practicable through embedded mitigation measures to reduce

[49] The Office of National Statistics (ONS) provides spatial data on levels of deprivation, using indicators of: 'multiple deprivation', 'employment', 'education', 'barriers to housing and social services',' crime' and 'living environment'. These data are based on the 2011 census and available by Lower Super Output area.
[50] http://www.apho.org.uk/
[51] Electoral wards are the spatial units used to elect local government councillors. National Census data are published at ward level.

adverse health effects on people. Examples of the mitigation measures incorporated into the design include the following:

- reducing the loss of property and community assets as far as reasonably practicable;
- reducing visual intrusion and noise as far as reasonably practicable; and
- incorporating landscape design and screening into the Proposed Scheme.

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

9.4.3 HS2 Ltd will require its contractors to comply with the environmental management regime for the Proposed Scheme, which includes the following core documents:

- the CoCP, which provides a generic basis for route-wide construction environmental management; and
- the LEMPs, which apply the management strategies at a local level.

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

Assessment of impacts and effects

Social capital

9.4.5 The connections between the individuals within communities, and the inclination that arises through these networks for individuals to feel valued, to feel a sense of belonging, to have companionship and to support each other, is important for health and wellbeing. A measure of the effectiveness of these connections within communities is termed 'social capital' and is a recognised determinant of health. Impacts on social capital can arise from changes to community facilities and community connectivity, and from changes in community demographics. Adverse effects on health from changes in social capital can be experienced as a reduction in wellbeing or as physiological effects on the body's hormonal and immune systems, with increased susceptibility to mental and physical illness.

9.4.6 When homes are lost from within a community, there is a potential for the remaining community to experience changes to their social environment and loss of social networks. For this to have an adverse effect on overall levels of social capital, the loss of homes would need to make up a sizeable proportion of the community. An estimated 44 residential properties would be demolished as a result of land requirements in the South Cheshire area. This includes the estimated 40 properties that are either completed or under construction within the Basford West development site, which would be demolished for the construction of the HS2 Crewe IMD[52]. Those residents directly affected by demolitions and relocations could experience adverse social capital effects, as assessed in the route-wide assessment of residential relocations in Volume 3. Due to the location of the Basford West development site,

[52] Any effects relating to future occupied properties on this site will be reported in the formal EIA Report.

which does not adjoin other residential areas, it is considered unlikely that the relocation of these residents would impact on levels of social capital within the communities on the south side of Crewe. The other four properties demolished as a result of the Proposed Scheme are distributed throughout the community area and are, therefore, not considered to affect social capital in any individual settlement. The effects on residents directly affected by property demolitions are assessed in the health section in Volume 3.

9.4.7 Delays caused by construction traffic on local roads have the potential to reduce community connectivity by increasing journey times between rural communities. The community assessment (Section 8) has identified potential impacts on connectivity in the following locations resulting from construction traffic on routes providing access to residential properties:

- a group of six residential properties on Den Lane. Den Lane would be used as a construction traffic route; and
- a group of 10 properties on Newcastle Road would be permanently affected by increased journey times due to the closure of Newcastle Road to the east, and tying in to the realigned Newcastle Road to the west of the properties. The realigned Newcastle Road would also be used as construction traffic route, potentially increasing journey times during construction.

9.4.8 Residents of these properties could experience increased journey times to nearby social and/or family networks, as well as community facilities. This could cause inconvenience and may deter people from travelling, potentially reducing levels of social interaction, resulting in a reduction of the beneficial health effects that are gained through access to community facilities, social contact and support.

9.4.9 The temporary construction workforce could comprise a mixture of local people and workers from further afield. Workers who live outside commuting distance of the site may choose to seek accommodation within the local community. This could mean that local communities see temporary changes to the local population size and demographics. An assessment of any adverse or beneficial effect these changes would have on social capital will be undertaken and reported on in the formal EIA Report. There is potential for the presence of the temporary workforce to have a beneficial effect on local communities through increased spending, thereby increasing income and employment opportunities.

Neighbourhood quality

9.4.10 The term 'neighbourhood quality' is used in this assessment to describe a combination of aspects that have the potential to affect residents' feelings about their local environment and thereby affect their quality of life and mental health and wellbeing. Communities will experience a number of effects during the construction of the Proposed Scheme, including construction traffic, construction noise and dust, and visual effects of the temporary and permanent works. The environmental and community impacts of these changes are assessed in the relevant sections of this report. This section assesses how changes to neighbourhood quality may affect people's levels of satisfaction with their local environment and perceptions about

issues such as personal safety and security, and considers how these issues may in turn affect wellbeing.

9.4.11 The link between health and the aesthetic value of the public realm is not well understood, but there is moderate evidence to suggest that an attractive environment can improve people's enjoyment and sense of wellbeing. Conversely, poor quality environments have been shown to have negative effects on people's health. There is moderate evidence that people have a preference for views of natural environments over man-made environments, and that exposure to views of natural environments is associated with increased wellbeing. The construction works and permanent structures would be visible from a large number of locations due to the scale of the Proposed Scheme. Section 11, Landscape and visual identifies locations that would experience changes in existing views, including country roads, PRoW and views from properties close to the Proposed Scheme. Effects on views may have negative effects on residents' perceptions of the quality and character of their local environment, which could lead to a reduction in wellbeing.

9.4.12 Temporary traffic and transport impacts would include:

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

9.4.13 At this stage, it is not anticipated that construction traffic atmospheric emissions (NO_2, NO_x, PM10 and PM2.5) would have adverse health effects. However, the presence of additional HGV traffic on the road network could raise local concerns about potential health effects, and perceived concerns about safety and frustration resulting from increased journey times. These perceptions could have a negative effect on people's satisfaction with their local environment.

9.4.14 Noise from construction traffic and construction activities can cause annoyance and disturbance and lead to temporary effects on quality of life. Section 13, Sound, noise and vibration has identified, on a precautionary basis, locations where residential communities may be adversely affected by construction traffic noise, as follows:

- Checkley Lane between the Proposed Scheme and A51 London Road;
- Den Lane between the Proposed Scheme and the A531 Newcastle Road at Wrinehill;
- Den Lane/Wrinehill Road and the B5071 Bridge Street/Wybunbury Road to the west of the Proposed Scheme to the A51 London Road at Walgherton;
- Chorlton Lane/Newcastle Road, between the Proposed Scheme to the A531 Newcastle Road, south of Weston; and
- Weston Lane, to the east of the Proposed Scheme through Weston to the A531 Newcastle Road.

9.4.15 Noise from construction can cause annoyance and disturbance and contribute to a reduction in neighbourhood quality. Section 13, Sound, noise and vibration identifies communities that may be affected by construction noise, on the basis of their

proximity to the proposed works. These include areas within the following settlements: Higher Den Farm, Mill Lane End (Mill Lane), Lane End Farm and Dairy Farm (Chorlton Lane), Chorlton (Chiltern Close, Henley Road, St. Clements Court and Westwood Close), Basford (Larch Avenue and Weston Lane), Hough (Casey Lane and A531 Newcastle Road) and Basford West (Crewe Road, Gresty Green Road and Hunter Avenue).

9.4.16 Construction activities have the potential to give rise to emissions of dust and particulate matter. Section 5, Air quality identifies no adverse effects with respect to the effects of construction activities on dust soiling and human health within the South Cheshire area, taking account of mitigation measures contained in the draft CoCP. Therefore, it is not expected that any direct health and wellbeing effects would arise as a result of air quality around areas required for construction.

9.4.17 Construction compounds are sometimes perceived as having the potential to attract activities such as vandalism, fly-tipping and theft of materials. Those living close to construction compounds may experience increased fear of crime and antisocial behaviour associated with their presence. Additionally, the diversion of footpaths around areas required for construction has the potential to affect actual or perceived personal safety, both in terms of road safety and environmental changes, such as sight lines and lighting. Fear of crime has been linked to health effects such as anxiety, and changes in behaviour, such as reduced participation in activities that are beneficial to health. The effects of increased crime and antisocial behaviour resulting from the construction of the Proposed Scheme are likely to be extremely low and the potential for crime and anti-social behaviour would be minimised through measures set out in the draft CoCP, such as worksite security, site lighting, hoarding, fencing and screening.

9.4.18 Overall, it is considered that the construction of the Proposed Scheme has the potential to affect wellbeing through changes to neighbourhood quality for the duration of the works. This will be assessed in the formal EIA Report.

Access to green space, recreation and physical activity

9.4.19 Environmental factors have been shown to influence participation in physical activity, which in turn affects health. This includes issues such as opportunities for active travel, the accessibility of facilities for physical exercise, perceived safety and amenity of outdoor areas and parks.

9.4.20 There is moderate evidence to suggest that physical activity can be encouraged by improving accessibility to green spaces, and by ensuring green spaces are attractive and of a high quality. Access to green space also contributes to good mental health and reduced stress. Section 8, Community has identified impacts upon the following two areas of green space within the South Cheshire area:

- part of Mill Lane Allotments (approximately 0.2ha) is located within land required for the construction of A500 Shavington Bypass realignment and Crotia Mill Lane realignment, and 0.1ha is within the land required for the operation of these routes. Approximately 25% of the allotment site would be inaccessible to the public during the construction period, and 13% of the site would be permanently inaccessible as a result of the Proposed Scheme; and

- land required for the construction and operation of the Proposed Scheme would result in severance of numerous PRoW, including three promoted PRoW, which are considered to provide a recreational resource.

9.4.21 Fear of traffic is identified as the most common barrier to cycling, although the level of fear is often exaggerated in comparison with the likelihood of injury. Fear of walking on footpaths and crossing roads with increased HGV traffic is also likely to deter walkers; particularly those with young children. There may be some reduction in the number of active travel journeys (cyclists and pedestrians) during construction as a result of increased volumes of HGV traffic on parts of the road network. These issues have the potential to reduce levels of active travel during the construction period, particularly in rural areas where there are fewer alternative routes available. Any effects will be reported in the formal EIA Report.

9.4.22 It is expected that the M6, the A51 London Road and A500 Newcastle Road/Shavington Bypass would provide the primary access routes for construction vehicles, from which HGVs would access construction compounds via Checkley Lane, the B5071 Wybunbury Road/Bridge Street/Wrinehill Road/Den Lane, the Newcastle Road (part of which is the A531)/Chorlton Lane, Weston Lane and the B5071 Jack Mills Way. Where reasonably practicable, HGVs would use the haul road alongside the route of the Proposed Scheme to reduce the impact on the local road network.

9.4.23 There would be temporary alternative routes for a number of PRoW during construction. Non-motorised users would be re-routed around construction compounds and areas of construction activity, which is likely to increase travel distances. Reduced amenity on PRoW during construction may result in a temporary reduction in their use, resulting in some reduction in levels of physical activity.

Access to services, health and social care

9.4.24 Impacts on access to services may arise as a result of increased demand for services (for example, from the construction workforce), direct impacts on local services and facilities, and changes in journey times due to road closures and diversions, which have the potential to affect access to services and emergency vehicle access.

9.4.25 There is strong evidence linking access to healthcare facilities with health outcomes, and there is also evidence to suggest that transport problems are a key barrier to people's ability to access these services. Therefore, changes in journey times to healthcare services have the potential to result in adverse health effects, if the delays are sufficient to deter people from attending appointments or seeking advice.

9.4.26 In the event that construction workers from outside the local area reside in the vicinity of the Proposed Scheme, it is considered likely that the majority of these workers would continue to be registered with their existing GPs rather than registering with a GP in the local area. The small minority who may choose to relocate to the area and register with a GP would be accommodated within the existing healthcare funding systems, which allocates funds to local health authorities on the basis of population size. Workers choosing to live in the local area for the purpose of accessing construction employment would remain in the area on a temporary basis for the duration of the works, and would not contribute to long term population growth.

9.4.27 As stated in the draft CoCP, HS2 Ltd or the nominated undertaker would provide occupational healthcare to temporary workers, including health assessment, health monitoring, preventative treatment, where necessary, and first aid. This is expected to help to reduce additional demand for local services, including accident and emergency services.

9.4.28 HS2 Ltd would work with emergency services to ensure that effects on emergency response times are reduced as far as reasonably practicable. This would include consideration of strategies for temporary and permanent traffic arrangements and construction routes, to reduce any potential effects.

9.4.29 There is weak to moderate evidence to suggest that access to shops and other local services can affect health. This is based on a range of factors affecting quality of life, and includes issues such as reducing feelings of isolation and enabling participation in society (see assessment of social capital), as well as accessing basic needs such as food shopping. Part of the South Cheshire area is a rural area, where communities rely on shops and services in nearby towns and villages, and where opportunities for short alternative routes are limited, resulting in longer diversions. There is a potential for communities to experience increased difficulty in accessing shops and community services (such as post offices, banks, libraries) as a result of increased journey times during construction. This will be assessed in the formal EIA Report.

Other mitigation measures

9.4.30 Other mitigation identified to reduce adverse impacts on health determinants during the construction of the Proposed Scheme in this area will be described in the formal EIA Report.

9.5 Effects arising during operation

Avoidance and mitigation measures

9.5.1 As described in Section 9.3, consideration of potential health issues is an integral part of the planning and design of the Proposed Scheme, alongside consideration of other environmental, community and economic issues. Mitigation measures will be described in the formal EIA Report.

Assessment of effects

9.5.2 Any health effects of operational train noise will be assessed in the formal EIA Report. No other operational effects additional to the permanent construction effects have been identified at this stage.

Other mitigation measures

9.5.3 Any other mitigation identified to reduce adverse impacts on health determinants during the operation of the Proposed Scheme in this area will be outlined in the formal EIA Report.

10 Land quality

10.1 Introduction

10.1.1 This section of the report presents the baseline conditions that exist along the Proposed Scheme in the South Cheshire area in relation to land quality and reports the impacts and likely significant effects resulting from construction and operation of the Proposed Scheme. Consideration is given to land that potentially contains contamination and land that has special geological significance, either from a scientific, historical, mineral exploitation or mineral resources point of view including geological SSSI and local geological sites (LGS), areas of historical brine extraction and areas of designated mineral resources. Mitigation measures are presented and any residual effects are summarised.

10.1.2 Potentially contaminated areas of land have been identified that could affect, or be affected by, the construction of the Proposed Scheme (for example, contaminated soils may need to be removed or the construction may alter existing contamination pathways). Each of these areas has been studied to evaluate the scale of potential impacts caused by existing contamination (if present) and what needs to be done to avoid significant consequences to people and the wider environment. The potential effects from operation of the Proposed Scheme are expected to be mitigated by operational and management controls.

10.1.3 Engagement with the BGS, CEC, the Environment Agency and FERA has been undertaken. The purpose of this engagement has been to discuss the Proposed Scheme and potential effects, and obtain relevant baseline information. Engagement with these stakeholders will continue as part of the development of the Proposed Scheme.

10.1.4 Maps showing the location of the key environmental features and the key construction and operation features of the Proposed Scheme can be found in the Volume 2, CA5 Map Book.

10.2 Scope, assumptions and limitations

10.2.1 The scope, assumptions and limitations for the land quality assessment are set out in the draft SMR and Volume 1.

10.2.2 In accordance with the draft SMR, a risk based approach is being undertaken to identify contamination that may have an impact upon the construction of the Proposed Scheme. To support this, an initial desk based assessment has been undertaken for the study area, defined as the land required for the Proposed Scheme plus a 250m buffer from the edge of proposed construction activities, but in the case of groundwater data, this is increased up to 1km. Selected site visits will be used to supplement desk-based information.

10.2.3 A conceptual site model (CSM) approach has been used to provide an initial understanding of the types of contaminants that may be present, the likely sources and/or pathways by which contamination can spread and the potential receptors (i.e. people and the wider environment) that could be affected. It indicates the types of

impacts that existing contamination may be having at present and may have during and after construction.

10.2.4 Baseline data collection is ongoing and the results of that work, in conjunction with ongoing engineering design development and further surveys, will inform the formal EIA Report and provide refinement, where necessary, to the assessment of effects during construction and operation.

10.3 Environmental baseline

Data collection

10.3.1 Baseline data has been collected from a range of sources including Ordnance Survey mapping, the BGS, Coal Authority, CEC, Public Health England, the Environment Agency Natural England and the FERA records, as well as web sources such as local geological trusts.

Field surveys

10.3.2 A familiarisation visit to the study area was made in March 2016, where the route of the Proposed Scheme was viewed from points of public access only.

10.3.3 Following the familiarisation visit and review of the baseline data, it was apparent that for many historical infill areas identified from the data, there are few obvious signs of these features on the ground when viewed from publicly accessible areas. On this basis, further surveys are likely to be required to confirm the exact location and condition of the identified infill areas and will be reported in the formal EIA Report.

Geology

10.3.4 This section describes the underlying ground conditions within the South Cheshire area. Recent changes in lithostratigraphic classifications by the BGS have been incorporated where appropriate[53].

Made ground

10.3.5 Made ground is a term used to denote man-made deposits such as landfill, spoil heaps or earthworks associated with construction or ground improvement. Such deposits may be poorly mapped and are often very variable in composition. Minor deposits of made ground may be encountered within this area, for example where ponds, sand or pits have been backfilled. Made ground is indicated to underlie the route of the Proposed Scheme between Basford and Crewe. There is evidence of historical and authorised landfilling within the area, which may comprise more significant deposits of made ground.

Superficial geology

10.3.6 Superficial glacial deposits from several glacial phases are present beneath parts of the study area. Post-glacial sediments within this part of the Proposed Scheme include alluvium, river terrace deposits and peat.

[53] British Geological Survey, (2014), Lithostratigraphy of the Sherwood Sandstone. Research Report RR/14/01. Available online at: http://www.bgs.ac.uk/downloads/start.cfm?id=2904

10.3.7 Glaciofluvial deposits are reported to underlie most of the Proposed Scheme between the southern end of the study area and Randilow Farmhouse.

10.3.8 Between Randilow Farmhouse and Blakenhall the Proposed Scheme is underlain by glacial sands and gravels and/or till, a poorly sorted glacial deposit, comprising particle sizes from clay to boulders.

10.3.9 Between Blakenhall and Chorlton Lane and to the east of the WCML, superficial deposits comprise mainly of glacial sands and gravels, with some till also to the west of the WCML.

10.3.10 Peat is present to the south of Higher Den House, near Den Lane and between Den Lane and Swill Brook, near Half Moon Farm.

10.3.11 Between the point at which Chorlton Lane would cross the route of the Proposed Scheme and a point approximately 300m south of the A500 Shavington Bypass, glacial sand and gravel dominate the superficial geology. North of this point, till is the dominant superficial geological unit.

10.3.12 The presence of alluvium and river terrace deposits is indicated along the line of Checkley Brook, Swill Brook, Gresty Brook and Valley Brook.

Bedrock geology

10.3.13 The Sidmouth Mudstone Formation, part of the Mercia Mudstone Group, continues from the southern part of the study area to Crewe. This geological unit comprises predominantly red-brown mudstone and siltstone. Units of halite up to hundreds of metres thick are present within this geological unit. Gypsum/anhydrite also occurs throughout the formation as nodules and veins.

10.3.14 Two halite-rich horizons are present within the Sidmouth Mudstone Formation. The Northwich Halite Member, comprising halite with thin mudstone layers is indicated to underlie the Proposed Scheme in the vicinity of Randilow Farm, approximately 1km south-west of Wrinehill. The Wilkesley Halite Member underlies the Proposed Scheme between a point approximately 200m east of Blakenhall and a point approximately 700m south of Basford. This unit also comprises halite with thin mudstone layers. Surface depressions formed by the dissolution of halite are typically infilled by peat or alluvial sediments.

Radon

10.3.15 Radon is radioactive gas formed by the radioactive decay of naturally occurring uranium in rocks and soils. This section of the route is not identified as an area of elevated radon potential as defined on Public Health England's UK Radon online maps[54].

Groundwater

10.3.16 Three categories of aquifer have been identified within the South Cheshire area, as defined by the Environment Agency.

[54] www.ukradon.org/information/ukmaps.

10.3.17 Glaciofluvial deposits, alluvium and river terrace deposits are classified as Secondary A aquifers.

10.3.18 The Sidmouth Mudstone Formation has been designated as a Secondary B aquifer.

10.3.19 Peat, till, the Wilkesley Halite Member and Northwich Halite Member are designated as Unproductive strata.

10.3.20 There are two licensed groundwater abstractions in the study area, located at Grange Farm. The abstractions are from the superficial deposits and the water from both abstractions is used for agriculture and domestic supply.

10.3.21 There are no groundwater Source Protection Zones in the South Cheshire area.

10.3.22 The information on private unlicensed water abstractions obtained from the local authorities indicates that there are no unlicensed groundwater abstractions located within the study area. Unregistered groundwater supplies may be present that would also need to be protected.

10.3.23 Groundwater bodies in the South Cheshire area are described in more detail within Section 15, Water resources and flood risk.

Surface water

10.3.24 Checkley Brook and the River Lea join south-west of Wrinehill Mill, and ultimately flow to the west and north-west. They are located just to the south of the South Cheshire boundary, but still within the land quality study area.

10.3.25 Gresty Brook and tributaries flow to the east of and parallel to the WCML railway. These watercourses cross into the study area in a number of locations, including in the vicinity of Betley Common, West Heath, Chorlton and Weston. Gresty Brook is currently culverted below the WCML and below the location of the proposed HS2 Crewe IMD. Downstream of the Gresty Brook culvert, the brook continues to flow westwards through the more built-up area of Wistaston.

10.3.26 Swill Brook flows through the study area, originating approximately 1km north of Half Moon Farm and flows northwards, before turning to the north-west some 240m south of Weston Lane.

10.3.27 Two unnamed watercourses, originating from in the vicinity of the WCML, flow westwards along the line of the A500 Shavington Bypass. One watercourse is located to the north and the other to the south of this road.

10.3.28 There are numerous ponds of varying sizes and a number of drains and minor watercourses along the route of the Proposed Scheme.

10.3.29 There are two licenced surface water abstractions in the study area, both of which are from unnamed watercourses. These are located at Weston Hall Estate to the east of the Proposed Scheme, and at Checkley Brook Farm.

10.3.30 Valley Brook transits the study area just north of Crewe station, flowing in a westerly direction.

10.3.31 Further information on surface waters is provided in Section 15, Water resources and flood risk.

Current and historical land use

10.3.32 Current potentially contaminative land uses within the study area include engineering works, light industrial units, evidence of fuel/storage tanks, existing railways (including the WCML), an active petrol filling station, closed petrol filling stations and several farms.

10.3.33 Historical land uses identified within the study area with the potential to have caused contamination, include several infilled extraction pits, possibly infilled ponds and historical landfills. The infilled pits and ponds may have been filled with a variety of waste materials.

10.3.34 The earliest historical mapping available shows the land being used predominantly for rural and agricultural purposes in the south of the study area, with an increasing amount of development northwards, towards Crewe.

10.3.35 The WCML is present throughout the entire study area and becomes more central to the area, progressing north. The WCML features many engineered cuttings and embankments plus bridges and tunnels for road crossings. The area south of Crewe has more extensive rail infrastructure, including main lines, engine sheds, sidings, shunting yards and goods loops. A number of tanks are also evident in historical mapping. This area has also experienced increased commercial and industrial activity, and in more recent years has undergone residential development around the southern edge of Crewe. These activities have required numerous earthworks, such as those associated with the ring road development.

10.3.36 The southern part of the study area comprises rural and agricultural settlements, with associated housing, agricultural buildings, pits and ponds. The pits in this area are commonly referred to as sand pits, reflecting the underlying glacial deposits. Many pits in later years have become ponds.

10.3.37 There is also evidence of some potential land contamination from light industry in the area around Gonsley Green Farm and south of Basford Hall, such as infilled brickfield clay extraction pits and landfill sites.

10.3.38 There are six historical landfills in the South Cheshire area:

- a historical landfill is located at Den Lane, Blakenhall, immediately adjacent to part of the proposed WCML realignment works. A water body is currently observed at this location;
- a historical area of clay extraction for brickmaking and subsequent brickfield tip is located north of Den Lane, approximately 580m north-east of Manor Farm, and is directly intersected by the Proposed Scheme;
- a historical landfill is located near Gonsley Green Farm, located approximately 1.4km north-east of Blakenhall and approximate 130m west of the route of the Proposed Scheme. This landfill received industrial waste;
- a historical landfill is located approximately 160m south-west of Weston Hall, on the northern side of Newcastle Road, east of the Proposed Scheme. This landfill received inert waste between 1986 and 1987;

- a historical landfill is located at Yew Tree Farm, approximately 120m south of Weston Lane, west of Millbeck Close and east of the Proposed Scheme. Industrial and household waste was received at this landfill between 1960 and 1972; and
- a former landfill site, referred to as British Rail Tip on Environment Agency records, is located approximately 100m north of Crewe station.

10.3.39 Contaminants commonly associated with landfills could include metals, semi-metals, asbestos, organic and inorganic compounds. Landfills and infilled pits could also give rise to landfill gases, such as methane or carbon dioxide, and leachate.

10.3.40 A number of other former quarries or pits are identified within the study area. It is possible that such features have been backfilled with waste materials. However, no records of any such infilling have been found, and no access onto land has been agreed for inspection. Further details will be provided in the formal EIA Report.

10.3.41 The area in the vicinity of the A532 Weston Road in Crewe has been subject to historical and continuing industrial use. Of particular note is the presence of a former iron and steel works located between the A532 Weston Road and the WCML, to the south-east of Cowley Road. Current land use in this area is predominantly light commercial and engineering works. A former gasometer is indicated at a location approximately 120m west of Gresty Bridge.

10.3.42 There are two former and one operational petrol filling stations in the study area. The former sites are located near the corner of Cobbs Lane and Newcastle Road in Hough, and between Hewett Street and Nantwich Road, near Crewe Station. The operational site is located on the western side of Macon Way, at the junction with the Nantwich Road, Crewe.

Other regulatory data

10.3.43 The regulatory data reviewed includes pollution incidents, radioactive and hazardous substances consents and environmental permits (previously landfill, Integrated Pollution Control (IPC) and Integrated Pollution Prevention and Control (IPPC) licences). Notable data are as follows:

- two substantiated pollution incidents, one of which occurred on 6 May 2001, causing a significant impact to water (Category 2) and involved the release of sewage materials at Basford Brook, to the west of Mere Road, Weston. The second occurred on 4 May 2009, causing a significant impact to water (Category 2) and a minor impact to air (Category 3) and involved the release of oils and fuels, north-west of Basford Hall Sidings, near Gresty Road, Crewe;
- two obsolete fuel station entries, registered as Hough Garage on Cobbs Lane, Hough and Nantwich Road Service Station, Crewe;
- one operational fuel station, registered to Crewe Arms Express on Nantwich Road, Crewe;
- seven significant (Category 2) pollution incidents to water, which involved five releases of oils, one release of rubble/litter or solids and one release of an unknown pollutant; and

- thirty-five minor (Category 3) pollution incidents to water, which involved 22 releases of oils, five releases of sewage, one release of silage effluent, one release of agricultural materials, one release of fat and five releases of unknown pollutants.

10.3.44 There are no ecological designations as defined in the land quality section of the draft SMR[55] located within the study area.

10.3.45 There are no other records within this study area.

Mining/mineral resources

10.3.46 CEC is the Minerals Planning Authority for South Cheshire Area. The Cheshire Replacement Minerals Local Plan, adopted in 1999, provides planning advice on where mineral development can take place. This document covers the Cheshire East and Cheshire West and Chester Boroughs. Minerals extracted from within areas covered by the plan include clay, peat, salt, sandstone, construction sand and silica sand. Spatial data relating to the above document is presented on the CEC website. These data indicate that there is an area of search for sand and gravel located approximately 50m to the east of Waybutt Lane, Chorlton. This area of search appears to overlap the study area to the east of the Proposed Scheme by approximately 70m.

10.3.47 Based on the current Replacement Minerals Local Plan (1999), the Proposed Scheme does not cross any mineral safeguarding areas. CEC are in the process of undertaking a review of the Mineral Plan and it is understood that there is a future proposal for mineral safeguarding areas for salt and sand and gravel extraction along the line of the Proposed Scheme. The proposed MSA for sand and gravel encompasses most of the route of the Proposed Scheme from the southern border of the study area to the A500 Shavington Bypass. The entire route within the South Cheshire area of the Proposed Scheme is identified as a proposed MSA for salt.

10.3.48 Based on the data presented on the CEC website, there are no current mineral extraction operations within the study area[56].

10.3.49 The portion of the South Cheshire area from Chorlton village northwards is covered by petroleum Blocks Under Offer in the 14th Onshore Round, specifically Block SJ75. Data provided on the UK Oil and Gas Authority website[57] indicates that Block SJ75[58] has been awarded to GDF Suez E&P UK Limited and Island Gas Limited.

10.3.50 There is an onshore conventional oil and gas well[59], owned by Hamilton Oil Company Ltd, located approximately 160m north of the point where Den Lane crosses the

[55] Sensitive ecological receptors are defined as national designations such as SSSIs
[56] http://cheshireeast.gov.uk/pdf/planning/spatial-planning/siteappraisalmaps.pdf
[57] https://ogauthority.maps.arcgis.com/apps/webappviewer/index.html
[58] If granted, the Petroleum Exploration and Development Licences (PEDLs) confer exclusive rights to 'search and bore for and get' petroleum for the area covered by the license to the awarded company(s). PEDL's do not automatically give permission for exploration or operations to begin. The necessary planning and regulatory consents will be required before any development can take place.
[59] Department of Energy and Climate Change reference LJ29-2.

WCML. The well was installed in 1992, and was subsequently plugged and abandoned[60].

10.3.51 The study area is located within the Bowland Shale Gas Study Area between the boundary with the adjacent Whitmore Heath to Madeley area (CA4) and a location in the vicinity of where Den Lane crosses the WCML. North of Den Lane, the remainder of the South Cheshire area is located within a Shale Prospective Area, as designated by DECC[61].

Geo-conservation resources

10.3.52 No geological SSSI or LGS sites have been identified within the study area to date. An assessment of geo-conservation resources is, therefore, not required.

Receptors

10.3.53 The sensitive receptors that have been identified within this study area are summarised in Table 7.

Table 7: Summary of sensitive receptors

Issue	Receptor type	Receptor description	Receptor sensitivity
Land contamination	People	Residents at existing properties	High
		Workers and visitors at nearby facilities	Moderate
		Public using PROW	Low
	Groundwater	Secondary A superficial aquifer	Moderate
		Secondary B bedrock aquifer	Moderate
		Unproductive strata	Low
	Surface waters	River Lea, Checkley Brook, Gresty Brook and tributaries	Moderate
		Swill Brook	Moderate
		Valley Brook	Moderate
		Ponds and drains	Low to moderate
	Built environment	Underground structures and buried services	Low
		Buildings and property	Low to high

[60] Mineral resource Information for National, Regional and Local Planning: Cheshire (comprising Cheshire and the Boroughs of Halton and Warrington) British Geological Survey Commissioned Report CR/05/090N.
[61] https://ogauthority.maps.arcgis.com/apps/webappviewer/index.html

Issue	Receptor type	Receptor description	Receptor sensitivity
Impacts on mining/mineral and petroleum sites (severance and sterilisation of sites)	Mining/mineral sites	Proposed sand and gravel MSAs	Moderate
		Proposed salt MSAs	Moderate
	Petroleum, oil and gas exploration licencing (including oil, gas and unconventional gas)	Blocks Under Offer in the 14th Onshore Round	Moderate
		Bowland Shale Gas study area	Minor
		Shale Prospective Area	Minor

10.4 Effects arising during construction

Avoidance and mitigation measures

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

10.4.2 The draft CoCP requires that prior to and during construction, a programme of further detailed investigations, which may include both desk based and site based work, would take place in order to confirm the full extent of areas of contamination. It also requires a risk assessment to be undertaken to determine what, if any, site specific remediation measures are required to allow the Proposed Scheme to be constructed safely and to prevent harmful future migration of contaminants. The investigation and assessment of potentially contaminated sites would be undertaken in accordance with guidance provided by the Environment Agency CLR11[62] and British Standards BS10175[63] and BS8576[64].

10.4.3 With the application of measures in the draft CoCP during the construction phase, no significant adverse effects on land quality are likely to result from the Proposed Scheme.

10.4.4 If remediation of contaminated soils or groundwater is required, there could be a beneficial effect for the environment in the long term, with respect to contamination.

[62] Environment Agency, (2004), CLR11 Model Procedures for the Management of Land Contamination.
[63] British Standard, (2011), BS10175+A1:2013 Investigation of Potentially Contaminated Sites.
[64] British Standard, (2013) BS8576 Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)

10.4.5 Where significant contamination is encountered, a remedial options appraisal would be undertaken to define the most appropriate remediation techniques. This appraisal would be undertaken based on multi-criteria attribute analysis that considers environmental, resource, social and economic factors in line with the framework set out by the Sustainable Remediation Forum UK[65]. The preferred option would then be developed into a remediation strategy.

Assessment of impacts and effects

10.4.6 Construction of the Proposed Scheme through the South Cheshire area would require earthworks, utility diversions, deep foundations, temporary dewatering and other activities, including the construction of the various viaducts and road infrastructure works. These aspects of the Proposed Scheme, along with other construction features, are shown on the CT-05 Map Series in Volume 2, CA5 Map Book.

Land contamination

10.4.7 In line with the assessment methodology, as set out in the draft SMR, an initial screening process has been undertaken to identify areas of current or historical contaminative use within the study area and to consider which of these areas might pose contaminative risks for the Proposed Scheme. Sites that present a low risk have not been taken further in the process. Any moderate to higher risk sites have been taken forward to more detailed risk assessments, in which the potential risks are assessed more fully. The majority of the areas undergoing the more detailed risk assessments are historical landfills and infilled pits/ponds, petrol filling stations, industrial works and railway land.

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

- whether the site is on or off the Proposed Scheme or associated off line works;
- the vertical profile of the route;
- the presence of underlying sensitive groundwater aquifers (Principal or Secondary A) or nearby watercourses; and
- the presence of adjacent residential properties or sensitive ecological receptors (none present in this area).

10.4.9 Clusters of potentially contaminated sites have been grouped, and assessed together, where appropriate.

10.4.10 A summary of the baseline CSM is provided Table 8. The impacts and baseline risks represent those before any mitigation is applied. Further sites may be included in the formal EIA Report.

[65] Sustainable Remediation Forum UK, (2010), A Framework for Assessing the Sustainability of Soil and Groundwater Remediation.

Table 8: Summary of baseline CSM for sites which may pose a contaminative risk for the Proposed Scheme

Area reference[66]	Area name	Main potential impacts	Main baseline risk
CA5-29	Historic landfill at Den Lane	Potential impact on human health on-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Moderate/low to moderate
		Potential impact on human health off-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Low to moderate/low
		Potential impact on groundwater quality (leaching, vertical and lateral migration from soils and water).	Moderate
		Potential impact on surface water quality (lateral migration through groundwater, direct runoff from site).	Low
		Potential impact on property receptors on-site and off-site (direct contact with soils and water, exposure to explosive gases).	Low to moderate/low
CA5-45 and CA5-48	Brickfield Refuse Tip and Brickfield	Potential impact on human health on-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Moderate/low
		Potential impact on human health off-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Low
		Potential impact on groundwater quality (leaching, vertical and lateral migration from soils and water).	Very low
		Potential impact on surface water quality (lateral migration through groundwater, direct runoff from site).	Low
		Potential impact on property receptors on-site and off-site (direct contact with soils and water, exposure to explosive gases).	Low to Moderate/low
CA5-55	Gonsley Green Farm landfill	Potential impact on human health on-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Moderate/low

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

Area reference[66]	Area name	Main potential impacts	Main baseline risk
		Potential impact on human health off-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Low to moderate/low
		Potential impact on groundwater quality (leaching, vertical and lateral migration from soils and water).	Very low
		Potential impact on surface water quality (lateral migration through groundwater, direct runoff from site).	Very low
		Potential impact on property receptors on-site and off-site (direct contact with soils and water, exposure to explosive gases).	Moderate/low
CA5-65 CA5-110 CA5-177	Railway infrastructure	Potential impact on human health on-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Moderate/low
		Potential impact on human health off-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Low
		Potential impact on groundwater quality (leaching, vertical and lateral migration from soils and water).	Moderate/low
		Potential impact on surface water quality (lateral migration through groundwater, direct runoff from site).	Moderate/low
		Potential impact on property receptors on-site and off-site (direct contact with soils and water, exposure to explosive gases).	Very low
CA5-94	Former petrol filling station	Potential impact on human health on-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Moderate/low
		Potential impact on human health off-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Low to moderate/low
		Potential impact on groundwater quality (leaching, vertical and lateral migration from soils and water).	Moderate/low

Area reference[66]	Area name	Main potential impacts	Main baseline risk
		Potential impact on surface water quality (lateral migration through groundwater, direct runoff from site).	Low
		Potential impact on property receptors on-site and off-site (direct contact with soils and water, exposure to explosive gases).	Moderate/low to moderate
CA5-101	Historical landfill site 160m south-west of Weston Hall	Potential impact on human health on-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Moderate/low
		Potential impact on human health off-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Moderate/low
		Potential impact on groundwater quality (leaching, vertical and lateral migration from soils and water).	High
		Potential impact on surface water quality (lateral migration through groundwater, direct runoff from site).	Moderate
		Potential impact on property receptors on-site and off-site (direct contact with soils and water, exposure to explosive gases).	Moderate/low to moderate
CA5-116	Historical landfill site at Yew Tree Farm	Potential impact on human health on-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Moderate/low
		Potential impact on human health off-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Moderate/low
		Potential impact on groundwater quality (leaching, vertical and lateral migration from soils and water).	High
		Potential impact on surface water quality (lateral migration through groundwater, direct runoff from site).	Moderate
		Potential impact on property receptors on-site and offsite (direct contact with soils and water, exposure to explosive gases).	Moderate/low to moderate
CA5-175	Former gasometer	Potential impact on human health on-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Moderate/low

Area reference[66]	Area name	Main potential impacts	Main baseline risk
		Potential impact on human health off-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Low
		Potential impact on groundwater quality (leaching, vertical and lateral migration from soils and water).	Low
		Potential impact on surface water quality (lateral migration through groundwater, direct runoff from site).	Low
		Potential impact on property receptors on-site and off-site (direct contact with soils and water, exposure to explosive gases).	Very low to moderate/low
CA5-202 CA5-209	Former iron and steel works	Potential impact on human health on-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Low to moderate/low
		Potential impact on human health off-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Low
		Potential impact on groundwater quality (leaching, vertical and lateral migration from soils and water).	Low
		Potential impact on surface water quality (lateral migration through groundwater, direct runoff from site).	Low
		Potential impact on property receptors on-site and off-site (direct contact with soils and water, exposure to explosive gases).	Very low to moderate/low
CA5-239	British Rail Tip	Potential impact on human health on-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Moderate/low
		Potential impact on human health off-site (direct contact, ingestion, inhalation of dusts and vapours from contaminated soils and groundwater and inhalation of ground gases).	Low
		Potential impact on groundwater quality (leaching, vertical and lateral migration from soils and water).	Moderate/low
		Potential impact on surface water quality (lateral migration through groundwater, direct runoff from site).	Low

Area reference[66]	Area name	Main potential impacts	Main baseline risk
		Potential impact on property receptors on-site and off-site (direct contact with soils and water, exposure to explosive gases).	Moderate/low to moderate

10.4.11 A screening assessment of the effects of contamination has been completed by comparing the detailed CSM developed for potential contaminated areas at baseline, construction and post-construction stages.

Temporary effects

10.4.12 In order to identify potentially temporary effects, the baseline and construction CSM have been compared to determine the change in level of risk at receptors during the construction stage, and thus to define the level of effect at the construction stage.

10.4.13 A worsening risk at construction stage compared to baseline would result in a negative effect, and conversely, an improvement would result in a positive effect. The assessment assumes mitigation through both the application of the draft CoCP and any necessary site-specific remediation.

10.4.14 Table 9 presents the summary of the resulting construction effects. This shows that based upon the assessment, no significant effects have been identified during the construction phase in relation to potential land contamination. The adoption of the draft CoCP makes it unlikely that there will be adverse consequences, but it is considered that there may still be temporary minor adverse effects (non-significant) during the construction period particularly from ground disturbance in areas of localised backfilling.

Table 9: Summary of temporary (construction) effects

Area reference[67]	Main baseline risk	Main construction Risk	Temporary effect and significance (Y/N)
CA5-29 Historical landfill at Den Lane	Potential impact on human health on-site = Moderate/low to moderate	Moderate	Minor adverse effect (N)
	Potential impact on human health off-site = Low to moderate/low	Low to moderate/low	Neutral effect (N)
	Potential impact on groundwater quality = Moderate	High	Minor adverse effect (N)
	Potential impact on surface water quality = Low	Moderate/low	Minor adverse effect (N)
	Potential impact on property receptors on-site and off-site = Low to moderate/low	Low to moderate/low	Neutral effect (N)

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

Area reference[67]	Main baseline risk	Main construction Risk	Temporary effect and significance (Y/N)
CA5-45 and CA5-48 Brickfield Refuse Tip and Brickfield	Potential impact on human health on-site = Moderate/low	Moderate	Minor adverse effect (N)
	Potential impact on human health off-site = Low	Low to moderate/low	Minor adverse effect (N)
	Potential impact on groundwater quality = Very low	Low	Minor adverse effect (N)
	Potential impact on surface water quality = Low	Low	Neutral effect (N)
	Potential impact on property receptors on-site and off-site = Low to moderate/low	Low to moderate/low	Neutral effect (N)
CA5-55 Gonsley Green Farm landfill	Potential impact on human health on-site = Moderate/low	Moderate	Minor adverse effect (N)
	Potential impact on human health off-site = Low to moderate/low	Low to moderate/low	Neutral effect (N)
	Potential impact on groundwater quality = Very low	Low	Minor adverse effect (N)
	Potential impact on surface water quality = Very low	Low	Minor adverse effect (N)
	Potential impact on property receptors on-site and off-site = Moderate/low	Moderate/low	Neutral effect (N)
CA5-65 CA5-110 CA5-177 Railway infrastructure	Potential impact on human health on-site = Moderate/low	Moderate/low	Neutral effect (N)
	Potential impact on human health off-site = Low	Low	Neutral effect (N)
	Potential impact on groundwater quality = Moderate/low	Moderate	Minor adverse effect (N)
	Potential impact on surface water quality = Moderate/low	Moderate	Minor adverse effect (N)
	Potential impact on property receptors on-site and off-site = Very low	Very low	Neutral effect (N)

Area reference[67]	Main baseline risk	Main construction Risk	Temporary effect and significance (Y/N)
CA5-94 Former petrol filling station	Potential impact on human health on-site = Moderate/low	Moderate	Minor adverse effect (N)
	Potential impact on human health off-site = Low to moderate/low	Moderate/low	Minor adverse effect (N)
	Potential impact on groundwater quality = Moderate/low	Moderate/low	Neutral effect (N)
	Potential impact on surface water quality = Low	Moderate/low	Minor adverse effect (N)
	Potential impact on property receptors on-site and off-site = Moderate/low to moderate	Moderate/low to moderate	Neutral effect (N)
CA5-101 Historical landfill site 160m south-west of Weston Hall	Potential impact on human health on-site = Moderate/low	Moderate	Minor adverse effect (N)
	Potential impact on human health off-site = Moderate/low	Moderate/low	Neutral effect (N)
	Potential impact on groundwater quality = High	High	Neutral effect (N)
	Potential impact on surface water quality = Moderate	High	Minor adverse effect (N)
	Potential impact on property receptors on-site and off-site = Moderate/low to moderate	Moderate/low to moderate	Neutral effect (N)
CA5-116 Historical landfill site at Yew Tree Farm	Potential impact on human health on-site = Moderate/low	Moderate	Minor adverse effect (N)
	Potential impact on human health off-site = Moderate/low	Moderate/low	Neutral effect (N)
	Potential impact on groundwater quality = High	High	Neutral effect (N)
	Potential impact on surface water quality = Moderate	High	Minor adverse effect (N)
	Potential impact on property receptors on-site and off-site = Moderate/low to moderate	Moderate/low to moderate	Neutral effect (N)

Area reference[67]	Main baseline risk	Main construction Risk	Temporary effect and significance (Y/N)
CA5-175 Former gasometer	Potential impact on human health on-site = Moderate/low	Moderate/low	Neutral effect (N)
	Potential impact on human health off-site = Low	Low	Neutral effect (N)
	Potential impact on groundwater quality = Low	Moderate/low	Minor adverse effect (N)
	Potential impact on surface water quality = Low	Low	Neutral effect (N)
	Potential impact on property receptors on-site and off-site = Very low to Moderate/low	Very low to moderate/low	Neutral effect (N)
CA5-202 CA5-209 Former iron and steel works	Potential impact on human health on-site = Low to moderate/low	Low to moderate/low	Neutral effect (N)
	Potential impact on human health off-site = Low	Low	Neutral effect (N)
	Potential impact on groundwater quality = Low	Low	Neutral effect (N)
	Potential impact on surface water quality = Low	Low	Neutral effect (N)
	Potential impact on property receptors on-site and off-site = Very low to moderate/low	Very low to moderate/low	Neutral effect (N)
CA5-239 British Rail Tip	Potential impact on human health on-site = Moderate/low	Moderate	Minor adverse effect (N)
	Potential impact on human health off-site = Low	Low	Minor adverse effect (N)
	Potential impact on groundwater quality = Moderate/low	Moderate	Minor adverse effect (N)
	Potential impact on surface water quality = Low	Moderate/low	Minor adverse effect (N)
	Potential impact on property receptors on-site and off-site = Moderate/low to moderate	Moderate/low to moderate	Neutral effect (N)

10.4.15 Following remediation of sites located within the study area, there would generally be overall negligible to moderate beneficial effects (non-significant and significant).

Mining/mineral resources

10.4.16 Construction of the Proposed Scheme has the potential to affect existing mineral resources and proposed areas of mineral exploitation. This could occur by sterilisation of the resource through direct excavation during construction of the Proposed Scheme or through temporary and/or permanent severance[68] or isolation that may occur during the construction phase of the Proposed Scheme, possibly continuing through to its operation.

Temporary effects

10.4.17 The majority of effects on mining and mineral sites will be permanent. However, temporary adverse effects (non-significant) may occur where construction compounds are proposed. In such cases there may be a temporary sterilisation of the resource during construction works, but this is not considered to represent a significant effect, as there would only be a delay in being able to access the resource, and the resource would not be lost permanently.

Permanent effects

10.4.18 Based on the current CEC Replacement Minerals Local Plan (1999), the Proposed Scheme does not cross any mineral safeguarding areas for aggregates or salt, although CEC is consulting on possible changes in the future. On this basis, no significant effects have been identified at this time. Petroleum exploration and extraction may also be impacted by the Proposed Scheme. Drilling and other operations may cause physical ground effects which are incompatible with maintaining a stable and level platform for the railway and supporting infrastructure. Such considerations may limit physical works below and alongside the Proposed Scheme.

10.4.19 Table 10 presents the assessment of effects from construction on the mining and mineral resources and oil and gas resources identified.

Table 10: Summary of effects for mining, mineral resources and oil and gas resources

Site name	Status	Description	Sensitivity/ value	Magnitude of impact	Effect and significance (Y/N)
Blocks Under Offer in the 14th Onshore Round.	Petroleum exploration blocks under offer	Petroleum exploration blocks (as defined by DECC)	Medium	Minor	Negligible (N)
Bowland Shale Gas Study Area.	Gas Study Area	Shale gas study area (as defined by DECC)	Low	Minor	Negligible (N)

[68] In this context, severance refers to the Proposed Scheme splitting an actual or proposed mining/mineral site into two or more areas, such that separate accesses would be required to work the whole site.

Site name	Status	Description	Sensitivity/ value	Magnitude of impact	Effect and significance (Y/N)
Shale Prospective Area	Shale Prospective Area	Prospective areas for shale gas/oil (as identified in BGS resource studies)	Low	Minor	Negligible (N)

10.4.20 On this basis there are anticipated to be no significant permanent effects, with respect to mineral resources or oil and gas resources.

Other mitigation measures

10.4.21 At this stage, no additional measures are considered necessary to mitigate risks from land contamination during the construction stage, beyond those that are set out in the draft CoCP and instigated as part of site specific remediation strategies, which would be developed at the detailed design stage if required. These measures would ensure that risks to people or property from contaminants in the ground would be controlled such that they would not be significant.

10.4.22 In addition to the excavation and/or treatment of contaminated soils, as described above, it may also be necessary to install ground (landfill) gas and leachate control systems within affected old landfill sites, on a temporary or permanent basis, to ensure that ground (landfill) gas and leachate migration pathways are controlled and do not adversely affect the Proposed Scheme or the wider environment as a consequence of the Proposed Scheme.

10.4.23 Mitigation of the effects on sand and gravel mineral resources within the proposed MSAs could include extraction of the resource, for use within the Proposed Scheme, or elsewhere. Extraction may be limited to landscaping areas within the Proposed Scheme adjacent to rather than beneath the trackbed, which would require good founding conditions. A plan will be discussed in advance of the construction works with the landowner, the mineral planning department at CEC, and any other relevant parties to assist in achieving an effective management of minerals within the affected location of the MSA.

Summary of likely residual significant effects

10.4.24 Based on the information currently available and with the application of the mitigation measures detailed above, no likely significant adverse residual effects have been identified. There would be a significant beneficial land quality residual effect resulting from the removal of potentially contaminated material from Brickfield Tip, Den Lane, which would also have a potentially beneficial effect on groundwater quality.

10.5 Effects arising during operation

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

Avoidance and mitigation measures

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

Assessment of impacts and effects

10.5.3 The Proposed Scheme within this area includes an auto-transformer station, which would be located near Checkley Lane, Wrinehill and an auto-transformer feeder station located on Newcastle Road, Chorlton. An auto-transformer station or an auto-transformer feeder station can, in principle, be a source of contamination through accidental discharge or leaks of coolant. However, in common with other modern substations, secondary containment appropriate to the level of risk would be included in the installed design.

10.5.4 The operation of the trains may give rise to minor contamination through leakage of hydraulic or lubricating oils. However, such leakage or spillage is expected to be very small and unlikely to result in significant contamination.

10.5.5 It is unlikely that there would be any cumulative effects on land quality receptors due to the environmental controls that would be placed on operational procedures.

Other mitigation measures

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

Summary of likely residual significant effects

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

11 Landscape and visual

11.1 Introduction

11.1.1 This section of the report presents the assessment of the likely significant landscape and visual effects within the South Cheshire area, based on known scheme information to date. It summarises the baseline conditions found within and around the route of the Proposed Scheme and describes the likely impacts and potential significant effects that may arise during construction and operation on landscape and visual receptors.

11.1.2 In this section, the operational assessment section refers not just to the running of the trains, vehicles on roads and associated lighting but also the presence of the new permanent infrastructure associated with the Proposed Scheme.

11.1.3 Principal landscape and visual issues in this area include:

- potential temporary effects to landscape and visual receptors during construction arising from the presence of: construction plant and compounds; construction of viaducts, the HS2 Crewe IMD, embankments and retaining walls, overbridges and underbridges; excavation of cuttings (including retained cuts); road and PRoW diversions and realignments; modifications to the WCML; and the removal of existing trees and vegetation; and
- potential permanent landscape and visual effects during operation arising from: moving trains and vehicles; the presence of new structures in the landscape, including viaducts, embankments, cuttings and retaining walls, the realigned section of the WCML, HS2 Crewe IMD, noise fence barriers, overbridges and underbridges, auto-transformer station, auto-transformer feeder station and overhead line equipment; and road and PRoW diversions and realignments.

11.1.4 A separate, but related, assessment of effects on the setting of heritage assets is included in Section 7, Cultural heritage.

11.1.5 Winter surveys for the landscape and visual assessment were undertaken from January 2016 to March 2016 to inform the draft assessment. Further surveys will be undertaken to inform the assessment and will be reported in the formal EIA Report

11.1.6 Engagement with CEC and Newcastle-under-Lyme Borough Council (NBC) has been undertaken. The purpose of this engagement has been to discuss the extent of the landscape and visual study area, the distribution of visual receptor viewpoints and the location of verifiable photomontages[69]. Engagement with these stakeholders will continue as part of the development of the Proposed Scheme.

11.1.7 Maps showing the location of the key environmental features and the key construction and operation features of the Proposed Scheme can be found in the LV-11 Map Series, Volume 2, CA5 Map Book.

[69] The working draft EIA Report does not contain photomontages, these will be produced to inform the formal EIA Report.

11.2 Scope, assumptions and limitations

11.2.1 The scope, key assumptions and limitations for the landscape and visual assessment are set out in Volume 1 and the draft SMR.

11.2.2 The extent of the study area has been informed by construction and operational phase zones of theoretical visibility (ZTV). The ZTVs have been produced in line with the methodology described in the draft SMR, and are an indication of the theoretical visibility of the Proposed Scheme. In some locations, extensive vegetation cover would mean the actual visibility is substantially less than that shown in the ZTVs and professional judgement on site has been used to refine the study area to focus on likely significant effects. Tall construction plant (for example cranes and piling rigs) is excluded from the ZTV for the construction phase, as there is a great degree of variability in the extent and timeframes of the visibility of construction activity and plant. Overhead line equipment is excluded from the ZTV for the operational phase, as inclusion indicates widespread visibility; however this rarely gives rise to significant effects if it is the only element visible. Overhead line equipment is described and taken into account in the assessment of effects on landscape character areas (LCA) and visual receptors. With the exclusion of overhead line equipment, the operational phase ZTV gives a better indication of the possible spread of significant effects and therefore better informs the assessment.

11.2.3 Landscape and visual receptors within approximately 500m of the Proposed Scheme have been assessed as part of the study area. Long distance views of up to 1km have been considered at settlement edges such as Wrinehill, Betley, Betley Common, Blakenhall, Wynbunbury, Chorlton/Wychwood Park, Hough, Shavington, Weston and Basford.

11.2.4 Trees would be retained where reasonably practicable, in line with the draft CoCP and disturbance reduced where possible.

11.2.5 This assessment is based on preliminary design information and makes reasonable worst case assumptions on the likely nature of potentially significant effects where these can be substantiated, and based on information known at present. The assessment covers the situation in winter and summer of year 1 and summer of year 15 of operation. Likely significant effects for year 60 will be reported in the formal EIA Report.

11.2.6 The assessment in this report does not consider cumulative impacts or future baseline. These will be addressed in the formal EIA Report. This will also be the case for consideration of night time visual effects, although where general night time visual effects can be substantiated they are discussed in the relevant part of this section. The findings from the night time surveys will be included in the formal EIA report.

11.2.7 Professional judgements on landscape value are summarised in the baseline descriptions. The draft assessment of sensitivity is summarised for each LCA, however, the judgements on susceptibility have been excluded from this report due to incomplete baseline survey data at the time. Full judgement on susceptibility and the resulting sensitivity assessment for each LCA will be provided in the formal EIA Report.

11.3 Environmental baseline

Landscape baseline

11.3.1 The study area extends from Wrinehill in the south to the edge of Crewe in the north. The southern part of the study area is predominantly rural in character with wooded stream valleys and small tracts of woodland, including ancient woodlands, which lie within the study area but would not be directly impacted by the Proposed Scheme. Agriculture is the main land use and the farmland is interspersed with small villages and a scattering of isolated dwellings and farmsteads. Towards Crewe, the landscape becomes increasingly urban, with the farmland being replaced by larger settlements, industrial and commercial land uses, although the edge of Crewe contains the highly valued landscape of Crewe Hall (a Grade II Registered Park and Garden forming the setting for the listed hall). The main residential areas are Wrinehill, Chorlton, Hough, Basford and Weston. Main roads within this area include Weston Lane, the A500 Shavington Bypass, B5071 Jack Mills Way/Crewe Road and Newcastle Road, which connects Crewe with the settlements of Chorlton, Betley, Wrinehill and Madeley Heath. The WCML passes through the area and together with the Basford sidings influences the southern edge of Crewe.

11.3.2 The LCAs have been determined with reference to published landscape character assessments supporting GIS data, aerial photography and Ordnance Survey mapping, plus desk study and fieldwork to confirm the appropriateness of area boundaries and subdivisions. Landscape character assessments reviewed include the relevant National Character Areas[70], the Staffordshire Landscape Guidelines[71] and Cheshire Landscape Character Assessment[72].

11.3.3 For the purposes of this assessment, the study area for South Cheshire has been subdivided into 13 LCAs. A summary of these is provided below.

Madeley Valley

11.3.4 A small part of this LCA lies within the South Cheshire area and is defined by the narrow incised course of the River Lea, with linear woodlands and areas of wet grassland and marsh in the valley floor giving way to gorse covered upper valley slopes. The Lum and Grafton's Wood ancient woodlands follow the upper course of the River Lea before joining the tree lined Checkley Brook, which forms most of the northern boundary of the LCA. The valley becomes less narrow further north, opening up into the larger scale more open and undulating farmland around Wrinehill Hall and Mill. This farmland shows evidence of field enlargement and loss of hedgerows. A small PRoW network provides access through the valley and across the WCML, which bisects the river valley between The Lum and Grafton's Wood. Low level noise from passing trains intermittently disturbs the tranquillity of this remote and secluded landscape. For these reasons the value of this LCA is considered to be medium-high.

[70] Natural England (2013, 2014), *National Character Area profiles*. Available online at: https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles

[71] Staffordshire County Council, Development Services Department (2000), *Planning for Landscape Change*. Available online at: https://www.staffordshire.gov.uk/environment/eLand/planners-developers/landscape/NaturalEnvironmentLandscapeCharacterTypes.aspx

[72] Cheshire County Council Transport and Regeneration Service (2008), *Cheshire Landscape Character Assessment*.

Checkley Farms and Woods

11.3.5 This LCA includes an area of intact, traditional farmland, which provides the setting for Checkley Village. The landscape has retained a natural appearance, with ancient woodland (Checkley Wood and Shaw's Rough), wooded stream valleys, a mix of pasture and arable fields, watercourses and ponds, and well managed hedgerows. Frequent mature hedgerow trees and field trees add further complexity to the landscape. Checkley Village has a strong historic character with a 17th century hall and listed buildings. Elsewhere, there is a pattern of dispersed settlement and historic buildings connected by a network of narrow winding lanes with hedges. There is a good PRoW network and the area is a valuable local recreational resource because of the natural and built historic associations of ancient woodland. For these reasons, the value of this LCA is considered to be medium-high.

Checkley Brook Lower Farms and Woods

11.3.6 This LCA comprises the narrow meandering wooded valley of Checkley Brook and the surrounding farmland. A series of pools along the brook are the legacy of sand and gravel extraction. The brook and the pools are an important fishing resource. The historic village of Wybunbury lies to the north of the area, but elsewhere the settlement pattern is one of is dispersed dwellings and farmsteads. Much of the valley's landscape and adjoining farmland and ancient woodlands retain a natural, attractive and tranquil character. Wybunbury Moss to the north of the village is an internationally important 'subsidence mere' (National Nature Reserve, SSSI, SAC and Ramsar Site). For these reasons, the value of this LCA is considered to be medium-high.

The Grange Lower Farms and Woods

11.3.7 This LCA is a landscape of large scale mainly arable farmland with evidence of field enlargement and loss of field boundary hedgerows. The farmland is relatively flat and exposed with little vegetation to create a sense of enclosure. The landscape lacks complexity and has few features of interest other than some intermittent hedgerows and views of Checkley Wood in the neighbouring LCA. The Grange Farm complex is a prominent feature as is an overhead power line and telecommunications mast. A small network of PRoW crosses the area between Blakenhall and The Grange. Despite the relative remoteness, the decline in traditional farming practices has reduced the scenic quality. The WCML crosses the area. For these reasons, the value of this LCA is considered to be low-medium.

Blakenhall Lower Farms and Woods

11.3.8 This LCA is defined by a rural landscape of medium scale pasture and arable fields bounded by intact hedgerows with mature trees and occasional woodland belts and copses. The raised lowland bog at Blakenhall Moss is a prominent landscape feature. To the north, the landscape around Den Lane, near to the WCML, is more rolling and smaller in scale. An extensive network of PRoW connects the area, including the regionally promoted South Cheshire Way and cycling routes near Lea Hall. The horizons are mostly defined by woodland, gently undulating arable and pastoral fields, mature hedgerow trees, and field boundary hedgerows although electricity pylons and wind turbines are noticeable in places. The WCML runs through the area

and is well integrated in the landscape following the field boundary pattern. It is crossed by an overhead power line to the north of Blakenhall. For these reasons, the value of this LCA is considered to be medium.

Betley Common Ancient Clay Farmlands

11.3.9 This LCA displays a complex and diverse landscape with a strongly intact pattern of small to medium scale rolling pastures and arable fields bounded by robust hedgerows with mature hedgerow trees. Water features are common and the landscape is further enriched around Betley Mere SSSI with lowland bog and woodland, rough grass and wetland habitat. Ancient woodlands and meandering, interconnected woodland belts are important landscape features. The historic villages of Betley and Wrinehill, isolated individual dwellings and farmsteads are connected by an extensive network of lanes, tracks and PRoW. Local lanes are frequently enclosed by mature trees and woodlands and are attractive and intimate in character. Betley village has a conservation area with listed buildings. Although the Newcastle Road runs through the area and electricity pylons and an overhead power line, telecommunications masts and individual wind turbines are present, these are not prominent. For these reasons, the value of this LCA is considered to be medium-high.

Border Fisheries Lower Farms and Woods

11.3.10 This LCA is defined by the commercial recreational fishery complex with its designed landscape of man-made lakes, ornamental planting and built facilities. The artificial landscape of lakes and ornamental planting has replaced the rural farmland, but is attractive and valued as a recreational resource. The sensitivity of the landscape is slightly reduced due to the presence of telecommunications masts and electricity pylons and the slightly degraded character of the surrounding farmland. The PRoW network is limited to the periphery of the area and is further limited by restricted access in the adjoining Wychwood Park. For these reasons, the value of this LCA is considered to be medium-high.

Hough Common

11.3.11 This LCA is defined primarily by small–medium scale pastures fringing the village of Hough. Hough Common, to the south of the village, is an open area of pasture and woodland. Other small woodlands and meres are scattered across the area adding local interest to what is essentially a farming landscape that, in places, shows some field enlargement and loss of field boundary hedgerows. Nearby modern settlement edges, electricity pylons and an overhead power line, telegraph poles and an overhead power line are also present in the landscape. The area has recreational value with Hough Common playing fields on the southern edge of the village, National Cycle Network Route 70, the regionally promoted South Cheshire Way and a local PRoW network. The WCML lies just beyond the LCA to the east and a number of local roads intersect in Hough village. For these reasons, the value of this LCA is considered to be medium-high.

Wychwood Park

11.3.12 This LCA is a modern suburban residential development set around two golf courses. The area has no known historic and few natural features. It is, however, valued for its recreational opportunities. The golf course landscapes, which are still maturing,

display a mix of managed fairways, rough grass and woodlands belts. Avenue trees and amenity planting within the housing areas promote a sense of a well-managed residential area. Transport and communication infrastructure is evident, with overhead line equipment of the WCML being visible to the west. For these reasons, the value of this LCA is considered to be medium.

Basford Brook Lower Farms and Woods

11.3.13 This LCA is located to the west and south of the village of Weston and is defined by the narrow, meandering tree lined course of Basford Brook with a diverse mix of tree species. It is a distinctive landscape with strong scenic qualities. The scale and appearance of pedestrian bridges and raised timber walkways are in keeping with landscape character. A limited but well managed PRoW network connects the LCA with Weston to the east and Hough to the south-west. The regionally promoted South Cheshire Way runs through the southern part of Basford Brook woods, an area of pleasant and tranquil natural woodland, which has a sense of remoteness and contrasts with the surrounding rural fringe farmland. For these reasons, the value of this LCA is considered to be medium-high.

Shavington/Crewe Outer Fringe Lower Farms and Woods

11.3.14 This LCA covers a large part of the semi-rural area south of the A500 Shavington Bypass. Although areas of higher scenic value and remoteness are found close to the western edge of Basford Brook LCA and along Weston Lane and Whites Lane, much of the area comprises urban fringe farmland with a dispersed settlement pattern, with views of Crewe forming the backdrop. The WCML passes through the centre of the area and electricity pylons are also present. For these reasons, the value of this LCA is considered to be low-medium.

Crewe Urban Fringe

11.3.15 This LCA lies between the A500 Shavington Bypass and the southern edge of Crewe and includes the settlements of Weston, Willaston and Shavington. Much of the area comprises degraded urban fringe farmland close to the A500 Shavington Bypass, commercial development and infrastructure associated with the WCML. Between the rear of houses on Crewe Road and the Basford Hall sidings yard, areas of new housing and commercial development are under construction on an area of unmanaged former farmland. Natural and historic landscape features are infrequent with remnant field systems and mature trees interspersed with modern housing development industrial/ commercial activity. Some areas of more intact farmland remain, particularly along the boundary with the Shavington/Crewe Outer Fringe Lower Farms and Woods LCA. Recreational facilities in the LCA include an extensive PRoW network, cycleway provision, including National Cycle Route 551, and sports facilities on Crewe Road. Road and rail movement and other activity reduce the tranquillity of the area. For these reasons, the value of this LCA is considered to be low-medium.

Crewe Hall

11.3.16 This LCA covers the historic and highly scenic grounds of Crewe Hall, a Grade I listed Jacobean hall and associated buildings. The wood-pasture, parkland and woodland grounds are listed as Grade II on the Register of Historic Parks and Gardens. The 18th century private parkland grounds were designed in part by Humphry Repton and

provide the setting for the hall and a number of other listed buildings and structures and are now managed as a hotel, spa and conference centre with extensive recreational facilities and amenities. Strong woodland belts screen views of the nearby settlement and impart a sense of tranquillity and enclosure to the park, which is located within the urban fringe of Crewe. PRoW are located to the periphery of the LCA only. For these reasons, the value of this LCA is considered to be high.

Visual baseline

11.3.17 A summary description of the distribution and types of receptors most likely to be affected is provided below. The viewpoints are numbered to identify their locations and are shown on the landscape character areas and viewpoint locations maps (see LV-11 Map Series, Volume 2, CA5 Map Book). In each case, the middle number (xxx.**xx**.xxx) identifies the type of receptor that is present in this area – 1: Protected Views (none within this area); 2: Residential; 3: Recreational[73]; 4: Transport; 5: Hotels/healthcare (none within this area); and 6: Employment (none within this area).

11.3.18 Residential visual receptors within the South Cheshire area are typically located within the settlements of Shavington, Hough, Weston and Wychwood Park, Betley, Wrinehill and a scattering of smaller villages and hamlets such as Checkley and Basford. Residential viewpoints are also located at numerous farmsteads and individual properties.

11.3.19 Principal recreational visual receptors are located at Wychwood Park Golf Club, Border fisheries and Crewe Hall and the extensive PRoW network, which includes footpaths, bridleways, national cycleways and walks along regionally promoted PRoW, including the South Cheshire Way.

11.4 Effects arising during construction

11.4.1 As is commonplace with major infrastructure works, the scale of the construction activities means that works would be visible in many locations and would have the potential to give rise to significant temporary effects that cannot be mitigated practicably. Such effects are temporary and vary over the construction period depending on the intensity and scale of the works at the time. The assessment of landscape and visual effects has been based on the activities occurring during the peak construction phase, which is defined as the period during which the main construction works would take place, including the establishment of compounds, main earthworks and structure works.

11.4.2 The potential effects associated with the peak construction phase in this area are generally considered to be medium term, given the anticipated length of the construction programme. The majority of the main and satellite compounds are assumed to be in place for the whole of this phase.

11.4.3 The construction works that have been taken into account in determining the potential effects on landscape and visual receptors, ordered from south to north, include:

[73] Reference to specific civil parish numbers for PRoW is provided where available otherwise the adjacent road name is used as a reference to the PRoW.

- construction of the HS2 main line and associated overhead line equipment;
- construction and use of the haul route alongside the HS2 main line for construction traffic and plant;
- construction of the South Crewe ATFS main compound and satellite compounds, as described in section 2.3;
- permanent diversion of Chorlton Lane and Casey Lane;
- permanent realignment of Checkley Lane, Den Lane, Newcastle Road, Casey Lane, the A500 Shavington Bypass, Weston Lane, B5071 Jack Mills Way/Crewe Road and Crotia Mill Lane;
- construction of the Randilow South drop inlet culvert, Randilow North drop inlet culvert, Blakenhall South inverted siphon, Blakenhall Spur culvert, Blakenhall drop inlet culvert, Gonsley drop inlet culvert, WCML Den Lane culvert, Half Moon inverted siphon, WCML Betley South culvert, WCML Betley North culvert and Basford West culvert;
- construction of balancing ponds and replacement floodplain storage areas;
- construction of the WCML realignment, a new section of the WCML, the HS2 spurs, the HS2 Crewe IMD access spurs from the HS2 main line and the WCML, and the HS2 Crewe IMD reception tracks;
- construction of the Checkley Brook, Den Lane West, Den Lane East, Blakenhall and Chorlton viaduct;
- construction of the Checkley North, Blakenhall South, Blakenhall North and Chorlton embankments;
- the excavations of the Blakenhall cutting (South), Blakenhall cutting (North), Blakenhall South-east cutting and Blakenhall North-east cutting and Crewe South retained cut;
- construction of the Den Lane (Central) underbridge and Blakenhall Bridleway 12 (Central) accommodation underbridge;
- construction of overbridges at Checkley Lane, replacement Den Lane (WCML), Blakenhall Bridleway 8, Blakenhall Bridleway 12 West, Blakenhall Bridleway 12 East, Chorlton Footpath 7, Newcastle Road, Weston Lane, the A500 Shavington Bypass and Crotia Mill Lane
- construction of an auto-transformer station at Wrinehill and an auto-transformer feeder station to the south-east of Newcastle Road;
- realignment of Checkley cum Wrinehill Footpath 4, Checkley cum Wrinehill Footpath 5, Checkley cum Wrinehill Footpath 8, Blakenhall Footpath 9, Blakenhall Bridleway 12, Basford Footpath 1, Basford Footpath 3, Basford Footpath 4, Basford Footpath 6, Basford Footpath 10; Basford Footpath 11; Chorlton Footpath 7, Chorlton Footpath 8 and Blakenhall Footpath 13;

- diversion of Blakenhall Bridleway 8, Blakenhall Footpath 7, Blakenhall Footpath 11; and Basford Footpath 5 Chorlton Footpath 13;
- utility diversions including diversion of overhead power lines to the south and east of the realigned Den Lane;
- demolition of three residential properties on Chorlton Lane, one residential property on Weston Lane and approximately 40 residential properties on the Basford West housing development; and
- lighting of construction works.

Avoidance and mitigation measures

11.4.4 Measures that have been incorporated into the draft CoCP to avoid or reduce landscape and visual effects during construction include the following:

- measures to reduce landscape and visual impacts associated with temporary site offices, vehicles, construction plant and compounds;
- avoidance of unnecessary tree and vegetation removal, and protection of existing trees in accordance with BS 5837: Trees in relation to design, demolition and construction[74];
- use of well-maintained hoardings and fencing;
- prevention of damage to the landscape features adjacent to the construction sites due to movement of construction vehicles and machinery;
- designing lighting to avoid unnecessary intrusion onto adjacent buildings and other land uses; and
- replacement of any trees intended to be retained that may die as a consequence of nearby construction works.

11.4.5 Implementation of these measures has been taken into account in the assessment of the construction effects.

Assessment of impacts and effects

Introduction

11.4.6 The most apparent changes to landscape and visual receptors during construction would relate to the presence of construction plant, the excavation of cuttings, erection of viaducts, construction of embankments and retaining walls, soils and material storage and stockpiling and the removal of existing landscape elements, including trees and hedgerows, as well as the closure and diversion of existing roads, and PRoW. Other key elements include the construction of overbridges and underbridges and compounds, plus property demolitions.

11.4.7 Effects in relation to landscape and visual receptors are summarised below.

[74] BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations, 2012, British Standard

Landscape assessment

11.4.8 Based on current data it is anticipated that potentially significant effects on landscape character would occur in relation to the following:

- Madeley Valley LCA is a landscape of medium-high susceptibility and medium-high sensitivity to change resulting from the Proposed Scheme. It would be directly impacted by construction of the Checkley Brook viaduct, Checkley Brook viaduct satellite compound and Checkley North embankment within the landscape. Although relatively few trees and hedgerows would have to be removed, the presence of earthworks and stockpiles would introduce alterations to the existing relatively flat landform. The presence of equipment and movement of construction vehicles would also introduce considerable disturbance into the relatively tranquil landscape. For these reasons, construction of the Proposed Scheme would potentially introduce a high magnitude of change and overall major adverse effect, although this would be very localised and most of the landscape character would remain unaffected.
- Checkley Brook Lower Farms and Woods LCA is a landscape of medium-high susceptibility and medium-high sensitivity to change resulting from the Proposed Scheme. It would be indirectly affected by construction of the Checkley Brook viaduct, Checkley North embankment, Checkley Lane east satellite compound, Wrinehill auto-transformer station and realignment of Checkley Lane. This would affect the scenic, intact and relatively tranquil southern part of this landscape. For these reasons, construction of the Proposed Scheme would potentially introduce a localised medium magnitude of change and an overall moderate adverse significant effect.
- Blakenhall Lower Farms and Woods LCA is a landscape of medium susceptibility and medium sensitivity to change resulting from the Proposed Scheme. This large LCA would be directly impacted by construction of the Checkley Brook viaduct, Den Lane East viaduct, Den Lane West viaduct, Blakenhall viaduct and Chorlton viaduct, Wrinehill auto-transformer station, realignment of the WCML, HS2 spurs, HS2 Crewe IMD access spurs, a number of retaining walls, the Crewe south retained cut, diversion of Chorlton Lane and realignment of Checkley Lane and construction of Den Lane (East) and Den Lane (West). These works would be managed from the Checkley Lane east satellite compound, Den Lane east satellite compound, Den Lane viaduct satellite compound and Blakenhall north embankment satellite compound within this landscape. These works would result in the removal of trees and hedgerows, whilst the presence of earthworks and stockpiles would alter the existing undulating or gently rolling landform. The presence of equipment and movement of construction vehicles would also introduce considerable disturbance into the relatively tranquil landscape. For these reasons, construction of the Proposed Scheme would potentially introduce a high magnitude of change and overall major adverse significant effect.
- The Grange Lower Farms and Woods LCA is a landscape of low-medium susceptibility and low-medium sensitivity to change resulting from the Proposed Scheme. It would be directly impacted by construction of the HS2

spurs and indirectly affected by realignment of Checkley Lane. Although relatively few trees and hedgerows would have to be removed, the presence of earthworks and stockpiles would alter the existing relatively flat landform. The presence of equipment and movement of construction vehicles would also introduce considerable disturbance into the relatively tranquil landscape. For these reasons, construction of the Proposed Scheme would potentially introduce a high magnitude of change and overall moderate adverse significant effect.

- Wychwood Park LCA is a landscape of medium-high susceptibility and medium-high sensitivity to change resulting from the Proposed Scheme. It would be indirectly affected by construction of the Chorlton viaduct, HS2 Crewe IMD access spurs, a number of retaining walls, the Crewe south retained cut and the South Crewe ATFS main compound. The presence of equipment and movement of construction vehicles would introduce considerable disturbance into the landscape and would affect the character of the western edge of this landscape. For these reasons, construction of the Proposed Scheme would potentially introduce a localised medium magnitude of change and an overall moderate adverse significant effect.

- Shavington/Crewe Outer Fringe Lower Farms and Woods LCA is a landscape of low-medium susceptibility and low-medium sensitivity to change resulting from the Proposed Scheme. This landscape would be directly impacted by construction of the South Crewe ATFS main compound, South Crewe auto-transformer feeder station, Crewe South retained cut, HS2 Crewe IMD access spurs, realignment of Newcastle Road, Weston Lane and Casey Lane. Although relatively few trees and hedgerows would have to be removed, the presence of earthworks and stockpiles would introduce alterations to the existing relatively flat landform. The presence of equipment and movement of construction vehicles would also introduce considerable disturbance into the rural landscape. For these reasons, construction of the Proposed Scheme would potentially introduce a high magnitude of change and overall major adverse significant effect, although this would be localised and much of the landscape would remain unaffected.

- Crewe Urban Fringe LCA is a landscape of low susceptibility and low-medium sensitivity to change resulting from the Proposed Scheme. This landscape would be directly impacted by construction of the A500 east and Basford satellite compounds, Crewe south retained cut, the HS2 Crewe IMD and the realignment of the A500 Shavington Bypass, Mill Lane and the Crewe Road/B5071 Jack Mills Way. Although relatively few trees and hedgerows would have to be removed, the presence of earthworks and stockpiles would introduce substantial alteration to the existing relatively flat landform. The presence of equipment and movement of construction vehicles would also introduce considerable disturbance into the landscape. The removal of four balancing ponds, between the Basford Hall sidings and the B5071 Jack Mills Way, would result in the disturbance of locally distinctive aquatic and marginal planting and earthworks contained within these landscape features. For the above reasons, construction of the Proposed Scheme would potentially

introduce a medium magnitude of change and overall moderate adverse significant effect in relation to this LCA.

Visual assessment

Introduction

11.4.9 The following section describes the likely significant effects on visual receptors during construction. The assessment has been undertaken during winter, in line with best practice guidance, to ensure a robust assessment. However, in some cases, visibility of construction activities may be reduced during summer when vegetation, if present in a view, would be in leaf. Where residential receptors would potentially experience significant effects at night time arising from additional lighting, these are also presented in this section.

11.4.10 Where a viewpoint represents multiple types of receptor, the assessment is based on the most sensitive receptor type. Effects on other receptor types with a lower sensitivity may be lower than those reported.

11.4.11 In most cases, additional lighting is not considered to give rise to significant effects due to the anticipated nature of the construction programme, except in areas in which 24 hour working is anticipated to take place (see paragraph 11.4.37 for further detail of construction lighting effects). Where there would be no direct foreground visibility of additional lighting, no further assessment has been undertaken.

Views north and north-east from residences at and near Checkley Lane Farm and Checkley cum Wrinehill Footpath 7, near Checkley Wood

11.4.12 From viewpoint 024-02-016 (Map LV-11-124b in Volume 2, CA5 Map Book), receptors would experience medium range to distant views of construction works related to the Checkley Brook viaduct, Checkley North embankment, a new balancing pond for railway drainage and associated access track. Although intervening trees would provide a degree of screening and filtering of views, the scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would substantially change the rural outlook. For these reasons, a medium magnitude of visual change and potentially moderate adverse significant effects are anticipated.

Views north and east from residences near Little Meadow and Checkley cum Wrinehill Footpath 4, east of Turncocks Lane

11.4.13 From viewpoint 024-03-019 (Map LV-11-124b in Volume 2, CA5 Map Book) receptors would experience close range views of construction activities related to the Checkley North embankment, a new balancing pond for railway drainage with associated access track, the Wrinehill auto-transformer station, the realignment of Checkley Lane and Checkley Lane east satellite compound. The prominence and scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and particularly a large temporary material stockpile would substantially change the current outlook across open fields. For these reasons a high magnitude of visual change and potentially major adverse significant effects are anticipated.

View east from residences on Checkley Lane and Turncocks Lane and recreational receptors using Checkley Lane and Checkley cum Wrinehill Footpath 7

11.4.14 From viewpoint 024-02-010 (Map LV-11-124b in Volume 2, CA5 Map Book) receptors would experience close range views of construction activities related to the realignment of Checkley Lane. The prominence and scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and particularly the presence of a large temporary material stockpile would substantially change the current outlook across open fields. For these reasons a high magnitude of visual change and potentially major adverse significant effects are anticipated.

Views east from Blakenhall Footpaths 4 and 17 close to The Grange

11.4.15 From viewpoints 024.02.009, 024.03.011 and 024.03.13 (Map LV-11-124b in Volume 2, CA5 Map Book) receptors would experience medium range views of construction activities relating to the HS2 spurs, Blakenhall retaining wall 1 and the realignment of Checkley Lane. The prominence and scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would substantially change the current outlook across the large scale open farmland. For these reasons a high magnitude of visual change and potentially major adverse significant effects are anticipated.

Views north-east from residences along Mill Lane and Blakenhall Footpath 2 and 4

11.4.16 From viewpoints 025.02.003 and 025.02.004 (Map LV-11-125 in Volume 2, CA5 Map Book) receptors would experience close to medium range views of construction activities related to the HS2 spurs, the Den Lane viaduct satellite compound, a number of retaining walls and the realignment of Den Lane to form Den Lane (West). There would also be more distant views of construction activity related to the realignment of the WCML and the realignment of Den Lane to form Den Lane (East). The prominence and scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would substantially change the current outlook across the large scale farmland, although in places views may be obscured by intervening mature trees. For these reasons a high magnitude of visual change and potentially major adverse significant effects are anticipated.

Views west and east from Den Lane near Higher Den Farm and Blakenhall Bridleway 9 and Blakenhall Footpath 9

11.4.17 From viewpoint 025.02.001 (Map LV-11-125 in Volume 2, CA5 Map Book) receptors would experience close range views to the west of construction activities related to the Den Lane east satellite compound and Den Lane viaduct satellite compound, HS2 spurs, a number of retaining walls, the realignment of Den Lane (West) and Den Lane viaducts. To the east there would be close range views of construction activity related to the realignment of the WCML and Den Lane (East). The prominence and scale of the construction activity, which would surround this viewpoint and include earthworks, presence of equipment, movement of construction vehicles, movement

of material and stockpiles would completely change the current rural outlook across the large scale farmland. There is little vegetation to provide any screening of views. For these reasons a high magnitude of visual change and potentially major adverse significant effects are anticipated.

Views north-east from residences along Mill Lane close to junction with Den Lane

11.4.18 From viewpoint 025.02.006 (Map LV-11-125 in Volume 2, CA5 Map Book) receptors would experience close range views of construction activities related to the Den Lane viaduct satellite compound, HS2 spurs, a number of retaining walls, the realignment of Den Lane (West), the Den Lane east viaduct, Den Lane West viaduct and Blakenhall viaduct. The prominence and scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would completely change the existing rural outlook across open fields. Other than hedgerows with the occasional hedgerow tree, there is little vegetation to provide any screening of views. For these reasons a high magnitude of visual change and potentially major adverse significant effects are anticipated.

Views north-east from residences along Wrinehill Road near Half Moon Farm

11.4.19 From viewpoint 025.02.014 (Map LV-11-125 in Volume 2, CA5 Map Book) receptors would experience medium range views of construction activities related to the Blakenhall North embankment satellite compound, HS2 spurs, the realignment of the WCML, HS2 Crewe IMD access spurs and a number of retaining walls. The prominence and scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would change the existing rural outlook across large mainly open fields. Other than hedgerows with some hedgerow trees, there is little vegetation to provide any screening of views. For these reasons a high magnitude of visual change and potentially major adverse significant effects are anticipated.

Views east from residences along Wrinehill Road near Lea Farm

11.4.20 From viewpoint 025.02.015 (Map LV-11-125 in Volume 2, CA5 Map Book) receptors would experience medium range to distant views of construction activities related to the Blakenhall North embankment satellite compound, HS2 spurs, the realignment of the WCML, HS2 Crewe IMD access spurs and a number of retaining walls. The prominence and scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would change the background view across the wide well treed rural valley. Other than hedgerows with some hedgerow trees, there is little vegetation to provide any screening of views. For these reasons a medium magnitude of visual change and potentially moderate adverse significant effects are anticipated.

Views west from residences along the western edge of Wychwood Park, Chorlton Footpath 3 and Waybutt Lane

11.4.21 From viewpoint 026.03.002 (Map LV-11-126 in Volume 2, CA5 Map Book) receptors would experience close range views of construction activities related to the HS2 spurs, Chorlton viaduct, HS2 Crewe IMD access spurs and a number of retaining walls. The

prominence and scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would substantially change the existing view across the WCML on low embankment towards a landscape of rural farmland with woodlands, tree groups and individual mature trees. For these reasons a high magnitude of visual change and potentially major adverse effects are anticipated.

Views west from residences along the western edge of Wychwood Park, Chorlton Footpath 10 and the Wychwood Park Golf Club

11.4.22 From viewpoint 026.02.006 (Map LV-11-126 in Volume 2, CA5 Map Book) receptors would experience close range views of construction activities related to the Crewe South retained cut, HS2 Crewe IMD access spurs, a number of retaining walls and diversion of Chorlton Lane. The prominence and scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would substantially change the existing view across the WCML and landscaped bund towards an area of rural farmland with woodlands, tree groups and individual mature trees. For these reasons a high magnitude of visual change and potentially major adverse effects are anticipated.

Views West from Wychwood Park Golf Club

11.4.23 From viewpoint 026.03.014 (Map LV-11-126 in Volume 2, CA5 Map Book) receptors would experience medium range views of construction activities related to the Crewe south retained cut, HS2 Crewe IMD access spurs, a number of retaining walls and diversion of Chorlton Lane. The prominence and scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would change the existing view across the golf course and WCML and landscaped bund, towards an area of rural farmland with woodlands, tree groups and individual mature trees. For these reasons a medium magnitude of visual change and potentially moderate adverse effects are anticipated.

Views east from Chorlton Footpath 1 and 7, Hough Footpath 8 and Hough Common area

11.4.24 From viewpoint 026-03-010 (Map LV-11-126 in Volume 2, CA5 Map Book) receptors would experience medium range views of construction activities related to the Crewe South retained cut, the HS2 Crewe IMD access spurs, diversion of Chorlton Lane, South Crewe ATFS main compound and the South Crewe auto-transformer feeder station. The prominence and scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would change the existing view across undulating relatively open farmland, although intermittent trees along Swill Brook would obscure or filter some views. For these reasons a high magnitude of visual change and potentially major adverse effects are anticipated.

Views (north and south) from residences along Newcastle Road

11.4.25 From viewpoint 026.02.022 (Map LV-11-126 in Volume 2, CA5 Map Book) receptors would experience close range views of construction activities related to the Crewe south retained cut, HS2 Crewe IMD access spurs, realignment of Newcastle Road, the South Crewe auto-transformer feeder station and the South Crewe ATFS main

compound. Newcastle Road would be realigned from immediately to the east of the properties. The prominence and scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would change the existing view across undulating relatively open farmland, although intermittent trees along Swill Brook would obscure or filter some views. For these reasons a high magnitude of visual change and potentially major adverse effects are anticipated.

Views west from Basford Footpath 6, the South Cheshire Way/ Two Saints Way and Newcastle Road

11.4.26 From viewpoint 026.03.020 (Map LV-11-126 in Volume 2, CA5 Map Book) receptors would experience close range views of construction activities related to the realignment of Newcastle Road and the extension to Chorlton Lane. There would also be medium range views related to the South Crewe ATFS main compound, and construction of the Crewe south retained cut, the HS2 Crewe IMD access spurs and South Crewe auto-transformer feeder station. The prominence and scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would substantially change the existing rural outlook across large scale farmland. For these reasons a high magnitude of visual change and potentially major adverse significant effects are anticipated.

Views east from residences on Back Lane and Newcastle Road, Basford Footpath 7 and National Cycle Route 70 near Hough

11.4.27 From viewpoint 027.02.001 and 026.03.028 (map LV-11-127 in Volume 2, CA5 Map Book) receptors would experience close range views of construction activities related to the realignment of Newcastle Road and medium range to distant views to construction works related to construction of the Crewe south retained cut, the HS2 Crewe IMD access spurs, South Crewe auto-transformer feeder station and South Crewe ATFS main compound. The prominence and scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would substantially change the existing rural outlook across gently undulating farmland. For these reasons a high magnitude of visual change and potentially major adverse significant effects are anticipated.

Views west from Basford Footpath 3 east of Casey Lane

11.4.28 From viewpoint 027-03-019 (map LV-11-127 in Volume 2, CA5 Map Book) receptors would experience close to medium range views of construction activities related to the Crewe south retained cut, the realignment of Weston Lane and the realignment of Casey Lane. The prominence and scale of the construction activity, including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would completely change the current rural outlook across a large open arable field. There are no hedgerows or trees to provide any screening or filtering of views. For these reasons a high magnitude of visual change and potentially major adverse significant effects are anticipated.

Views north and east from residences along Larch Avenue and Basford Footpath 11

11.4.29 From viewpoint 027-02-012 (map LV-11-127 in Volume 2, CA5 Map Book) receptors would experience close range views of construction activities including the HS2 Crewe IMD reception tracks, the Weston Lane realignment, Basford satellite compound, the realignment of the A500 Shavington Bypass and the extension to Larch Avenue. The prominence and scale of the construction activity, which would surround this viewpoint on three sides and include earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would completely change the current rural outlook across the large scale farmland. There would be little vegetation left to provide any screening or filtering of views. For these reasons a high magnitude of visual change and potentially major adverse significant effects are anticipated.

Views (north and south) from residences along Weston Lane

11.4.30 From viewpoint 027-02-010 (map LV-11-127 in Volume 2, CA5 Map Book) receptors would experience close to medium range views of construction activities related to the Crewe south retained cut and the realignment of the A500 Shavington Bypass. Although intervening trees would provide a degree of screening and filtering of views, the scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would substantially change the rural outlook. For these reasons a high magnitude of visual change and potentially major adverse significant effects are anticipated.

Views north from residences along Weston Lane

11.4.31 From viewpoint 027-02-010 (Map LV-11-127 in Volume 2, CA5 Map Book) receptors would experience close to medium range views of construction activities related to the realigned A500 Shavington Bypass. Views would be partially obscured and filtered by the hedgerows and scattered field and hedgerow trees although the scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would change the rural outlook. For these reasons a high magnitude of visual change and potentially major adverse significant effects are anticipated.

Views east from residences along the Crewe Road

11.4.32 From viewpoint 027-02-011 (map LV-11-127 in Volume 2, CA5 Map Book) receptors would experience close to medium range views of construction activities related to the realignment of the A500 Shavington Bypass. Although intervening trees would provide a degree of screening and filtering of views, the scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would be very noticeable and would change the existing rural outlook across open fields. For these reasons a medium magnitude of visual change and potentially moderate adverse significant effects are anticipated.

Views north-west and west from residences along Whites Lane and Weston Footpath 11

11.4.33 From viewpoint 027-03-20 (map LV-11-127 in Volume 2, CA5 Map Book) receptors would experience close to medium range views of construction activities related to the A500 east satellite compound, realignment of the A500 Shavington Bypass, Crotia Mill Lane and Weston Lane, and the realignment of Casey Lane. The scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would be very noticeable and would change the existing outlook across open fields. There is little intervening vegetation to obscure or filter views. For these reasons a medium magnitude of visual change and potentially moderate adverse significant effects are anticipated.

Views north-west and west from residences and allotments along the northern edge of Weston, Weston Footpath 9 and National Cycle Route 70

11.4.34 From viewpoints 027-03-016 and 027-03-017 (map LV-11-127 in Volume 2, CA5 Map Book) receptors would experience close range views of construction activities related to the A500 east satellite compound, realignment of Weston Lane, realignment of Casey Lane and realignment of the A500 Shavington Bypass. Although intervening trees would provide a degree of screening and filtering of views, the scale of the construction activity including earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would be very noticeable and would change the existing rural outlook across open fields. For these reasons a high magnitude of visual change and potentially major adverse significant effects are anticipated.

Views from Dairy House, Weston Lane and Basford Footpath 1

11.4.35 From viewpoints 027-02-014 (map LV-11-127 in Volume 2, CA5 Map Book) receptors would experience close range views of construction activities related to the A500 East satellite compound and transfer node, the HS2 Crewe IMD access spurs, the realignments of the A500 Shavington Bypass, Crotia Mill Lane and Weston Lane, and the realignment of Casey Lane. This activity which includes earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would surround the viewpoint and would completely change the outlook. For these reasons a high magnitude of visual change and potentially major adverse significant effects are anticipated.

Views from Crotia Mill Farm, Shavington cum Gresty Footpath 2 and Weston Footpath 17

11.4.36 From viewpoint 027-03-024 (map LV-11-127 in Volume 2, CA5 Map Book) receptors would experience close range views of construction activities related to the realignment of the A500 Shavington Bypass and Crotia Mill Lane, and medium range views relating to the A500 east satellite compound and the Crewe satellite compound, although existing vegetation would obscure and filter some views. This activity which includes earthworks, presence of equipment, movement of construction vehicles, movement of material and stockpiles would change the outlook from this viewpoint although intervening mature trees would obscure and filter some views. For these

reasons a medium magnitude of visual change and potentially moderate adverse significant effects are anticipated.

Night time effects

11.4.37 Night time surveys will be undertaken for the formal EIA Report. Potential visual impacts arising from additional lighting at night during construction within the South Cheshire area may arise from continuous working and/or overnight working at the South Crewe ATFS main compoundand the HS2 Crewe IMD.

11.4.38 The addition of lighting could give rise to significant effects in relation to a number of receptors. More detail will be provided in the formal EIA Report on completion of the night time assessment.

Other mitigation measures

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

Summary of likely residual significant effects

11.4.40 These effects would be temporary and reversible in nature lasting only for the duration of the construction works. Any significant effects would generally arise from the widespread presence of construction activity and construction plant within the landscape and viewed from surrounding residential receptors, and users of PRoW and main roads within the study area. It is anticipated that the following significant effects would remain after implementation of construction phase mitigation:

- major adverse landscape effects in relation to the Madeley Valley LCA, Blakenhall Lower Farms and Woods LCA and Shavington/Crewe Outer Fringe Lower Farms and Woods LCA;
- moderate adverse landscape effects in relation to the Checkley Brook Lower Farms and Woods LCA, The Grange Lower Farms and Woods LCA, Wychwood Park LCA and Crewe Urban Fringe LCA;
- major adverse visual effects in relation to Checkley cum Wrinehill Footpaths 4 and 7, Blakenhall Footpaths 2, 4, 9 and 17, Blakenhall Bridleway 9, along Den Lane, Chorlton Footpaths 3 and 10, Wychwood Park golf course, Waybutt Lane, Chorlton Footpaths 1 and 7, Hough Footpath 8, Hough common, Basford Footpaths 1, 3, 6 and 7, National Cycle Route 70, the South Cheshire Way/Two Saints Way and Weston Footpath 9;
- major adverse visual effects in relation to residential receptors living in the Madeley Valley, west of Wrinehill and Betley and near Little Meadow, on Checkley Lane and Turncocks Lane, residences along Mill Lane, along Wrinehill Road, along the western edge of Wychwood Park, along Newcastle Road,

between Hough and Weston (east and west of the Proposed Scheme), along Back Lane, along Larch Avenue, along Weston Lane, residences north of Weston, at Dairy House;

- moderate adverse visual effects in relation to Shavington cum Gresty Footpath 2, Weston Footpath 11, Weston Footpath 17 and the Wychwood Park golf course;
- moderate adverse visual effects in relation to residential receptors living at and near Checkley Lane Farm, near Checkley Wood, along Wrinehill Road, along Crewe Road and along Whites Lane, and at Crotia Mill Farm.

11.5 Effects arising during operation

11.5.1 The specific elements of the Proposed Scheme that have been taken into account in determining the effects on landscape and visual receptors include:

- the presence of the HS2 main line including presence of trains, track, overhead line equipment and supporting infrastructure;
- the permanent diversion of Chorlton Lane;
- the permanent realignment of Checkley Lane, Den Lane, Newcastle Road, Casey Lane, the A500 Shavington Bypass, Weston Lane, Crewe Road and Crotia Mill Lane;
- the presence of the Randilow South drop inlet culvert, Randilow North drop inlet culvert, Blakenhall South inverted siphon, Blakenhall Spur culvert, Blakenhall drop inlet culvert, Gonsley drop inlet culvert, WCML Den Lane culvert, Half Moon inverted siphon, WCML Betley South culvert, WCML Betley North culvert and Basford West culvert;
- the presence of balancing ponds and replacement floodplain storage areas;
- the WCML realignment, a new section of the WCML, the HS2 spurs, the HS2 Crewe IMD access spurs from the HS2 main line and the WCML and the HS2 Crewe IMD reception tracks;
- the presence of viaducts over Checkley Brook, Den Lane West, Den Lane East, and at Blakenhall and Chorlton;
- the presence of the Checkley North, Blakenhall North, Blakenhall South and Chorlton embankments;
- the excavations of the Blakenhall cutting (South) Blakenhall cutting (North), Blakenhall South-east cutting, Blakenhall North-east cutting and the Crewe south retained cut;
- the presence of the Den Lane (Central) underbridge and Blakenhall Bridleway 12 (Central) accommodation underbridge;
- the presence of overbridges at Checkley Lane, replacement Den Lane (WCML), Blakenhall Bridleway 8, Blakenhall Bridleway 12 West, Blakenhall Bridleway 12

East, Chorlton Footpath 7, Newcastle Road, Weston Lane, the A500 Shavington Bypass and Crotia Mill Lane;

- the permanent diversions of Blakenhall Bridleway 8, Blakenhall Footpath 7 and Basford Footpath 5;
- the realignment of Checkley cum Wrinehill Footpath 5 near Checkley Road, Blakenhall Footpath 9, Blakenhall Bridleway 12, Basford Footpath 1, Basford Footpath 3, Basford Footpath 6, Basford Footpath 11, Chorlton Footpath 7, Chorlton Footpath 8 and Blakenhall Footpath 13;
- permanent closure of Basford Footpath 17;
- the presence of the Wrinehill auto-transformer station and the South Crewe auto-transformer feeder station;
- the presence of new landscape bunds, false cuttings, ponds and planting;
- the presence of fencing and noise barriers; and
- the presence of the HS2 Crewe IMD and associated lighting.

Avoidance and mitigation measures

11.5.2 The operational assessment of impacts and effects is based on year 1 (2027) and year 15 (2042) of the Proposed Scheme. Operational impacts for year 60 (2087) of the Proposed Scheme will be assessed and reported in the formal EIA Report. A process of iterative design and assessment has been employed to avoid or reduce adverse effects during the operation of the Proposed Scheme. Measures incorporated into the design of the Proposed Scheme include:

- design of earthworks to tie the engineering earthworks for embankments and cuttings into their landscape context and to mitigate views of structures and overhead line equipment from sensitive receptors where reasonably practicable. Earthworks also consider the relationship to surrounding land uses and management such as agriculture;
- compensatory woodland planting in areas of loss using the same species composition and planting types and to provide enhanced landscape and green infrastructure connectivity, as well as connectivity of historic designed landscape features where reasonably practicable;
- hedgerow replacement and restoration in areas of loss to restore connectivity and landscape pattern where reasonably practicable and to tie the Proposed Scheme mitigation into wider landscape character; and
- compensation for loss of field ponds with new wetlands, water balancing and biodiversity wetland features.

Assessment of impacts and effects

Introduction

11.5.3 The likely effects on landscape character and viewpoints during operation of the Proposed Scheme relate to the presence of new structures and elements in the

landscape. Other aspects include the presence of overhead line equipment, noise barriers and fencing and the presence of the South Crewe auto-transformer feeder station and the HS2 Crewe IMD.

Landscape assessment

11.5.4 The Madeley Valley LCA would be directly impacted by the presence of the Checkley Brook viaduct, and Checkley South embankment (in the Whitmore Heath to Madeley area (CA4)). Mitigation earthworks (including grading of embankment slopes) and planting would help to integrate these elements into the landscape, but at year 1, before the planting matures, the landform and land cover pattern would appear substantially changed. The presence of these features would affect the openness of the farmland, causing visual severance and interruption of landscape scale along the valley. The rural landscape character would be substantially changed. Introduction of the Proposed Scheme would introduce a high magnitude of change and lead to an overall major adverse significant effect on the character of the landscape within this LCA in both winter and summer of year 1.

11.5.5 The Blakenhall Lower Farms and Woods LCA would be directly affected by the presence of the Checkley Brook viaduct, Blakenhall viaduct, Den Lane East viaduct, Den Lane West viaduct, Chorlton viaduct, Wrinehill auto-transformer station, the realigned WCML, HS2 spurs, HS2 Crewe IMD access spurs, a number of retaining walls, the Crewe South retained cut, diverted section of Chorlton Lane and the realigned Checkley Lane and Den Lane. Additional potential effects would arise from the presence of embankments and cuttings. The presence of the Proposed Scheme would intensify the effects of the existing WCML and these effects would potentially be greatest where the alignments of the WCML and the Proposed Scheme merge in the open farmland west of Wychwood Park. Here the loss of vegetation and presence of large scale and often complex infrastructure would change the character of the farmland, causing severance of the hedgerow pattern, and interruption of the landscape pattern. South of Wychwood Park the WCML and Proposed Scheme would be further apart. Although the effects here may be less intense, an area of farmland between the WCML and the Proposed Scheme would be encircled by rail infrastructure. This would change the perceptual characteristics of the landscape, with an increased sense of severance and a reduction in tranquillity and scenic quality. Mitigation earthworks (including grading of embankment slopes) and planting would help to integrate the different elements of the Proposed Scheme into the landscape, but at year 1, before the planting matures, the landform and land cover pattern would appear substantially changed. The presence of these features would affect the openness of the farmland, causing visual severance and interruption of landscape scale along the valley. The character of the horizon would also be substantially changed. Introduction of the Proposed Scheme would lead to a high magnitude of change and an overall major adverse significant effect on the character of the landscape within this LCA in both winter and summer of year 1.

11.5.6 Shavington/Crewe Outer Fringe Lower Farms and Woods LCA would be directly impacted by the presence of the South Crewe auto-transformer feeder station, Crewe South retained cut, HS2 Crewe IMD access spurs, the realigned Newcastle Road, Weston Lane and Casey Lane. Mitigation earthworks (including grading of embankment slopes) and planting would help to integrate the different elements of

the Proposed Scheme into the landscape, but at year 1, before the planting matures, the landform and land cover pattern would appear substantially changed. Although this landscape is comprised primarily of urban fringe farmland, the scale and prominence of the new infrastructure would intensify the effects of the WCML and the perception of severance. The presence of new large scale structures such as the South Crewe auto-transformer feeder station and various road realignments would also contribute to a reduction in scenic quality and tranquillity. Introduction of the Proposed Scheme would lead to a medium magnitude of change and overall moderate adverse effect on the character of the landscape within this LCA in both winter and summer of year 1.

11.5.7 Crewe Urban Fringe LCA would be directly impacted by the presence of the Crewe south retained cut, the HS2 Crewe IMD and the realigned A500 Shavington Bypass, Crotia Mill Lane, and the B5071 Jack Mills Way/Crewe Road. Mitigation earthworks (including grading of embankment slopes) and planting would help to integrate the different elements of the Proposed Scheme into the landscape, but at Year 1, before the planting matures, the landform and land cover pattern would appear substantially changed. The scale and prominence of the new infrastructure would intensify the effects of the WCML and perceptions of severance caused by the recently constructed B5071 Jack Mills Way and the A5020 David Whitby Way. The HS2 Crewe IMD would completely alter the landscape of the former farmland between the Basford Hall sidings and the B5071 Jack Mills Way. Introduction of the Proposed Scheme would lead to a medium magnitude of change and overall moderate adverse significant effect on the character of the landscape within this LCA in both winter and summer of year 1.

11.5.8 By summer of year 15, due to the establishment of landscape mitigation planting, the above landscape effects would potentially be slightly reduced although they would remain significant (major adverse for Madeley Valley LCAs and moderate for Blakenhall Lower Farms and Woods, Shavington/Crewe Outer Fringe Lower Farms and Woods and Crewe Urban Fringe LCAs) due to the level of severance, physical changes to the landform and land cover, and change to rural landscape character created by the Proposed Scheme.

Visual assessment

Introduction

11.5.9 The following section describes the likely significant effects on visual receptors during operation year 1 and year 15. The assessment has been undertaken for the winter period, in line with best practice guidance, to ensure a robust assessment. However, in some cases, visibility of the operational Proposed Scheme may be reduced during summer when vegetation, if present in a view, would be in leaf. Likely significant effects on residential receptors from additional lighting at night time are also identified.

11.5.10 Where a viewpoint represents multiple types of receptor, the assessment is based on the most sensitive receptors. Effects on other receptor types with lower sensitivity may be lower than those reported.

11.5.11 In most cases, additional lighting is not considered to give rise to significant effects due to the operational nature of the Proposed Scheme (with the exception of the HS2

Crewe IMD). Where there would be no direct foreground visibility of additional lighting, no further assessment has been undertaken.

11.5.12 Visual receptor groups that experience significant construction phase effects and are not likely to experience significant effects at year 1 include residences on Wrinehill Road, Crewe Road and Whites Lane and recreational receptors using Checkley cum Wrinehill Footpath 7, near Checkley Wood, and Weston Footpath 11.

Views north and east from residences near Little Meadow and Checkley cum Wrinehill Footpath 4, east of Turncocks Lane

11.5.13 In winter and summer of year 1, from viewpoint 024.03.019 (map LV-11-124b in Volume 2, CA5 Map Book), users of Checkley cum Wrinehill Footpath 4 would experience close to medium range views of the Proposed Scheme including the Checkley North embankment, a new balancing pond for railway drainage with associated access track, the Wrinehill auto-transformer station and the realigned Checkley Lane. The prominence and scale of these elements would substantially change the current outlook across open fields towards the tree lined River Lea and more distant views across the valley towards a well treed horizon. For these reasons it is anticipated there would be a high magnitude of visual change and major adverse visual effects.

11.5.14 It is likely that significant visual effects would remain at year 15, although views of the HS2 main line and embankment would be partially obscured and filtered by new hedgerow and hedgerow trees. The Checkley North embankment would remain a prominent feature. For these reasons it is anticipated there would be moderate adverse visual effects.

View east from residences on Checkley Lane and Turncocks Lane and recreational receptors using Checkley Lane and Checkley cum Wrinehill Footpath 7

11.5.15 In summer and winter of year 1, from viewpoint 024-02-010 (map LV-11-124b in Volume 2, CA5 Map Book), at the junction of Checkley Lane and Turncocks Lane, receptors would experience close range views of the Proposed Scheme including the realigned Checkley Lane. Two new balancing ponds and associated access tracks may also be visible. Although views of the lower parts of the Proposed Scheme, including the movement of passing trains, are likely to be obscured by the intervening landform, the upper parts including the overhead line equipment may be visible at medium range. For these reasons it is anticipated there would be a medium magnitude of visual change and moderate adverse effects.

11.5.16 The effects may be slightly reduced in summer in year 1 due to remaining trees along Checkley Lane being in leaf and obscuring some views.

11.5.17 It is likely that effects would reduce to non-significant at year 15, due to views being partially obscured and filtered by the maturing hedgerows and hedgerow trees along the base of the Checkley North embankment, which would also assist in integrating the embankment and Proposed Scheme into their context.

Views east from Blakenhall Footpaths 4 and 17 close to The Grange

11.5.18 In winter and summer of year 1, from viewpoints 024.02.009, 024.03.011 and 024.03.13 (Map LV-11-124b in Volume 2, CA5 Map Book) receptors would experience medium range views of the Proposed Scheme including the HS2 spurs, Blakenhall retaining wall 1 and the realigned Checkley Lane. There are few trees or hedgerows to provide screening although the relatively flat landform combined with the distance means that the infrastructure would recede into the background. For these reasons it is anticipated there would be a medium magnitude of visual change and moderate adverse effects.

11.5.19 It is likely that effects would reduce to non-significant at year 15, due to views being partially obscured and filtered by the maturing hedgerow and hedgerow trees along the base of the Checkley North embankment and the new woodland planting between the HS2 spur (northbound) and HS2 main line. This planting would also assist in integrating the Proposed Scheme into its context.

Views north-east from residences along Mill Lane and Blakenhall Footpath 2 and 4

11.5.20 In summer and winter of year 1, from viewpoints 025.02.003 and 025.02.004 (Map LV-11-125 in Volume 2, CA5 Map Book) receptors would experience close to medium range views of the Proposed Scheme including the HS2 spurs, the Den Lane East viaduct, the Den Lane West viaduct, a number of retaining walls and the realigned Den Lane (West). There would also be more distant views of the realigned WCML and realigned Den Lane (East). Views would be partially obscured and filtered by the hedgerows and scattered field and hedgerow trees. For these reasons it is anticipated there would be a medium magnitude of visual change and moderate adverse effects.

11.5.21 The effects may be slightly reduced in summer in year 1 due to remaining trees along Checkley Lane being in leaf and obscuring some views.

11.5.22 It is likely that effects would reduce to non-significant at year 15, due to views being partially obscured and filtered by the maturing hedgerow and hedgerow trees along the base of the Blakenhall South embankment and the new woodland planting between the HS2 spur (northbound) and HS2 main line. This planting would also assist in integrating the Proposed Scheme into its landscape context.

Views west and east from Den Lane near Higher Den Farm and Blakenhall Bridleway 9 and Blakenhall Footpath 9

11.5.23 In winter and summer of year 1, from viewpoint 025.02.001 (Map LV-11-125 in Volume 2, CA5 Map Book) receptors would experience close range views to the west of the Proposed Scheme including the HS2 spurs, a number of retaining walls, the realigned Den Lane (West), Den Lane East viaduct and Den Lane West viaduct. To the east there would be close range views of the realigned WCML and realigned Den Lane (East). There are few trees or hedgerows to provide screening or filtering of views and the outlook from the viewpoint would be completely changed, particularly to the west. For these reasons it is anticipated there would be a high magnitude of visual change and major adverse effects.

11.5.24 It is likely that significant visual effects would remain at year 15, although views of the Proposed Scheme would be partially obscured and filtered by the maturing mitigation planting and the various structures would be more integrated into their context. The outlook from the viewpoint would still be focussed on rail infrastructure both to the east and west, although the setting would be more wooded than the present open farmland. The Den Lane viaducts and associated embankments are likely to remain prominent features. For these reasons it is anticipated there would be moderate adverse visual effects.

Views north-east from residences along Mill Lane close to junction with Den Lane

11.5.25 In winter and summer of year 1, from viewpoint 025.02.006 (Map LV-11-125 in Volume 2, CA5 Map Book) receptors would experience close range views of the Proposed Scheme, including the HS2 spurs, a number of retaining walls, realigned Den Lane (West), the Den Lane East viaduct, Den Lane West viaduct and the Blakenhall viaduct. Other than hedgerows with the occasional hedgerow tree, there is little vegetation to provide any screening of views, although the false cutting to the north of Den Lane would provide some screening of the lower parts of the infrastructure. For these reasons it is anticipated there would be a high magnitude of visual change and major adverse visual effects.

11.5.26 It is likely that significant visual effects would remain at year 15, although views of the Proposed Scheme would be obscured and filtered by the maturing mitigation planting and the various structures would be more integrated into their context. The outlook from the viewpoint would be of developing woodland rather than open pastures. The Den Lane viaducts and associated embankments are likely to remain prominent landscape features. For these reasons it is anticipated there would be moderate adverse visual effects.

Views north-east from residences along Wrinehill Road near Half Moon Farm

11.5.27 In winter and summer of year 1, from viewpoint 025.02.014 (Map LV-11-125 in Volume 2, CA5 Map Book) receptors would experience medium range views of the Proposed Scheme including the HS2 spurs, the realigned WCML, HS2 Crewe IMD access spurs and a number of retaining walls. The intervening hedgerows and hedgerow trees would provide some screening of views but the existing rural outlook would still be substantially changed. For these reasons it is anticipated there would be a medium magnitude of visual change and moderate adverse effects.

11.5.28 The effects may be slightly reduced in summer in year 1 due to intervening field and hedgerow trees being in leaf and obscuring some views.

11.5.29 It is likely that effects would reduce to non-significant at year 15, due to views being partially obscured and filtered by the maturing hedgerow and hedgerow trees along the west side of HS2 spur (northbound). This planting would also assist in integrating the Proposed Scheme into its landscape context.

Views west from residences along the western edge of Wychwood Park, Chorlton Footpath 3 and Waybutt Lane

11.5.30 In winter and summer of year 1, from viewpoint 026.03.002 (Map LV-11-126 in Volume 2, CA5 Map Book) there would be close range views of the Proposed Scheme including the HS2 spurs, Chorlton viaduct, HS2 Crewe IMD access spurs and a number of retaining walls. Other than the occasional tree along the existing embankment to the east of the WCML, there is little vegetation to provide any screening of views. For these reasons it is anticipated there would be a high magnitude of visual change and major adverse significant effects.

11.5.31 The effects may be slightly reduced in summer in year 1 due to intervening field and hedgerow trees being in leaf and obscuring some views.

11.5.32 It is likely that significant visual effects would remain at year 15, although views of the Proposed Scheme would be obscured and filtered by the maturing mitigation planting and the various structures would be more integrated into their landscape context. The outlook from the viewpoint would be of a developing linear woodland belt rather than open farmland. For these reasons it is anticipated there would be moderate adverse significant effects.

Views west from residences along the western edge of Wychwood Park, Chorlton Footpath 10 and the Wychwood Park golf course

11.5.33 In winter and summer of year 1, from viewpoint 026.02.006 (Map LV-11-126 in Volume 2, CA5 Map Book) receptors would experience close to medium range views of the Proposed Scheme including the Crewe South retained cut, HS2 Crewe IMD access spurs, a number of retaining walls and the diverted section of Chorlton Lane. Other than the occasional tree along the existing embankment to the east of the WCML, there is little vegetation to provide any screening of views, although the existing landscape bund would be increased in height by approximately 2m which would provide some screening of the lower parts of the both the existing WCML and the Proposed Scheme. For these reasons it is anticipated there would be a high magnitude of visual change and potentially major adverse significant effects.

11.5.34 It is likely that significant visual effects would remain at year 15, although views of the Proposed Scheme would be obscured and filtered by the maturing mitigation planting on the false cutting and the various structures would be more integrated into their landscape context. The outlook from the viewpoint would be of a developing linear woodland belt rather than open farmland. For these reasons it is anticipated there would be moderate adverse significant visual effects.

Views east from Chorlton Footpath 1 and 7, Hough Footpath 8 and Hough Common area

11.5.35 In winter and summer of year 1, from viewpoint 026.03.010 (Map LV-11-126 in Volume 2, CA5 Map Book) receptors would experience medium range views of the Proposed Scheme including the Crewe South retained cut, the HS2 Crewe IMD access spurs, diverted section of Chorlton Lane and the South Crewe auto-transformer feeder station. Although the Proposed Scheme would intensify the effects of the WCML with a concentration of overhead line equipment, the existing vegetation would continue to provide a degree of screening and filtering of views. For these reasons it is

anticipated there would be a medium magnitude of visual change and moderate adverse significant effects.

11.5.36 The effects may be slightly reduced in summer in year 1 due to the trees along Swill Brook being in leaf and obscuring some views.

11.5.37 It is likely that significant visual effects would remain at year 15, as there is no mitigation planting proposed in this location and there would continue to be partially filtered views of the existing WCML and Proposed Scheme running in close parallel. For these reasons it is anticipated that there would still be moderate adverse visual effects.

Views (north and south) from residences along Newcastle Road

11.5.38 In winter and summer of year 1, from viewpoint 026.02.022 (Map LV-11-126 in Volume 2, CA5 Map Book) receptors would experience close range views of the realigned Newcastle Road and the South Crewe auto-transformer feeder station. Newcastle Road would be closed immediately to the east of the properties. Elements of the Proposed Scheme would be visible in all directions from this viewpoint and the outlook would be completely changed. For these reasons it is anticipated there would be a high magnitude of visual change and major adverse visual effects.

11.5.39 The effects may be slightly reduced in summer in year 1 due to trees being in leaf and obscuring some views.

11.5.40 It is likely that significant visual effects would remain at year 15. Although some views of the Proposed Scheme would be obscured and filtered by the maturing mitigation planting and the various structures would be more integrated into their context, the outlook would be one of developing woodland rather than open views across farmland. For these reasons it is anticipated there would still be major adverse significant visual effects.

Views west from Basford Footpath 6, the South Cheshire Way/ Two Saints Way and Newcastle Road

11.5.41 In winter and summer of year 1, from viewpoint 026.03.020 (Map LV-11-126 in Volume 2, CA5 Map Book) there would be close range views of the realigned Newcastle Road and the extension to Chorlton Lane. There would also be medium range views related to the Crewe South retained cut, the HS2 Crewe IMD access spurs and the South Crewe auto-transformer feeder station. The Proposed Scheme would substantially change the view, which is currently large scale farmland. There would also be medium range to distant views of the Proposed Scheme which would lead to a concentration of overhead line equipment and intensify the effects of the WCML. For these reasons it is anticipated there would be a high magnitude of visual change and potentially major adverse visual effects.

11.5.42 It is likely that effects would reduce to non-significant at year 15, due to views being partially obscured and filtered by the maturing hedgerow and hedgerow trees along the eastern side of the realigned Newcastle Road embankment and linear woodland planting along the western side of the realigned road. This planting would also assist in integrating the realigned Newcastle Road into its landscape context.

Views east from residences on Back Lane and Newcastle Road, Basford Footpath 7 and National Cycle Route 70 near Hough

11.5.43 In winter and summer of year 1, from viewpoint 027.02.001 and 026.03.028 (Map LV-11-127 in Volume 2, CA5 Map Book) receptors would experience close range views of the Proposed Scheme including the realigned Newcastle Road and medium range to distant views of the Crewe South retained cut, the HS2 Crewe IMD access spurs and the South Crewe auto-transformer feeder station. Trees along Casey Lane and Newcastle Road would partially obscure and filter some views but the presence of the realigned Newcastle Road would substantially change the existing rural outlook across gently undulating farmland. For these reasons it is anticipated there would be a high magnitude of visual change and major adverse effects.

11.5.44 The effects may be slightly reduced in summer in year 1 due to vegetation being in leaf and obscuring some views.

11.5.45 It is likely that significant visual effects would remain at year 15, although views of the Proposed Scheme would be obscured and filtered by the maturing mitigation planting which would help integrate the realigned Newcastle Road into its landscape context. For these reasons it is anticipated there would be moderate adverse visual effects.

Views west from Basford Footpath 3 east of Casey Lane

11.5.46 In winter and summer of year 1, from viewpoint 027-03-019 (Map LV-11-127 in Volume 2, CA5 Map Book) receptors would experience close to medium range views of the Proposed Scheme including the Crewe South retained cut, the realigned Weston Lane and the realigned section of Casey Lane. There are no hedgerows or trees to provide any screening or filtering of views, but the main elements of the Proposed Scheme are at some distance from the viewpoint. For these reasons it is anticipated there would be a medium magnitude of visual change and potentially moderate adverse effects.

11.5.47 It is likely that effects would reduce to non-significant at year 15, due to views being partially obscured and filtered by the maturing mitigation planting around the realigned Casey Road and along the base of the embankment of the realigned Weston Lane. This planting would also assist in integrating the realigned roads into their context.

Views east (north and south) from residences near Weston Lane

11.5.48 In winter and summer of year 1, from viewpoint 027-02-012 (Map LV-11-127 in Volume 2, CA5 Map Book) receptors would experience close to medium range views of the Crewe south retained cut, the realigned A500 Shavington Bypass and the extension to Larch Avenue. Elements of the Proposed Scheme would be visible from this viewpoint and the outlook would be completely changed. To the north, the A500 Shavington Bypass overbridge would be a prominent landscape feature. For these reasons it is anticipated there would be a high magnitude of visual change and potentially major adverse effects.

11.5.49 It is likely that significant visual effects would remain at year 15. Although some views of the Proposed Scheme would be obscured and filtered by the maturing mitigation planting and the Proposed Scheme and realigned roads would be more integrated into their context, the outlook would be completely changed. To the north, the A500

Shavington Bypass overbridge would remain prominent. For these reasons it is anticipated there would still be major adverse visual effects.

Views north from residences along Weston Lane

11.5.50 In winter and summer of year 1, from viewpoint 027-02-010 (Map LV-11-127 in Volume 2, CA5 Map Book) receptors would experience close to medium range views of construction works related to the realigned A500 Shavington Bypass. Views would be partially obscured and filtered by the hedgerows and scattered field and hedgerow trees. For these reasons it is anticipated there would be a medium magnitude of visual change and moderate adverse significant effects.

11.5.51 The effects may be slightly reduced in summer in year 1 due to trees being in leaf and obscuring some views.

11.5.52 It is likely that effects would reduce to non-significant at year 15, due to views being partially obscured and filtered by the maturing mitigation planting along the south side of the realigned A500 Shavington Bypass. This planting would also assist in integrating the Proposed Scheme into its landscape context.

Views north and west from residences and allotments along the northern edge of Weston, Weston Footpath 9 and National Cycle Route 70

11.5.53 In winter and summer of year 1, from viewpoints 027-03-016 and 027-03-017 (Map LV-11-127 in Volume 2, CA5 Map Book) there would be close range views of the Proposed Scheme including the realigned A500 Shavington Bypass realignment, the realigned Crotia Mill Lane, the realigned Weston Lane and the realigned Casey Lane. The bypass would be on a low embankment and noticeably closer to the viewpoints, whilst also directly impacting on part of the allotments. There would be little vegetation to obscure or filter views. For these reasons it is anticipated there would be a high magnitude of visual change and major adverse significant effects.

11.5.54 It is likely that effects would reduce to non-significant at year 15, due to views being partially obscured and filtered by the maturing mitigation planting along the south side of the realigned A500 Shavington Bypass and along the realigned Weston Lane. This planting would also assist in integrating the realigned roads into their context.

Views from Dairy House, Weston Lane and Basford Footpath 1

11.5.55 In winter and summer of year 1, from viewpoint 027-02-014 (Map LV-11-127 in Volume 2, CA5 Map Book) receptors would experience close range views of the Proposed Scheme including the HS2 Crewe IMD access spurs, the realigned A500 Shavington Bypass, the realigned Crotia Mill Lane, the realigned Weston Lane and the realigned section of Casey Lane. The outlook from this viewpoint would be completely changed and there would be little remaining vegetation to obscure or filter views. For these reasons it is anticipated there would be a high magnitude of visual change and potential major adverse significant effects.

11.5.56 It is likely that significant visual effects would remain at year 15. Although some views of the Proposed Scheme would be obscured and filtered to a degree by the maturing mitigation planting and the Proposed Scheme and realigned roads would be more integrated into their context, the outlook would remain completely changed. The

A500 Shavington Bypass overbridge would be a prominent feature. For these reasons it is anticipated there would still be major adverse significant visual effects.

Views from Crotia Mill Farm, Shavington cum Gresty Footpath 2 and Weston Footpath 17

11.5.57 In winter and summer of year 1, from viewpoint 027-03-024 (Map LV-11-127 in Volume 2, CA5 Map Book) there would be close range views of the realigned A500 Shavington Bypass and realigned Crotia Mill Lane, although existing vegetation would obscure and filter some views. For these reasons it is anticipated there would be a medium magnitude of visual change and moderate adverse significant effects.

11.5.58 The effects may be slightly reduced in summer in year 1 due to trees being in leaf and obscuring some views.

11.5.59 It is likely that effects would reduce to non-significant at year 15, due to views being partially obscured and filtered by the extensive existing woodland planting along the north side of the current alignment of the A500 Shavington Bypass.

Night time effects

11.5.60 Night time surveys will be undertaken for the formal EIA Report. Potential visual effects arising from additional lighting at night may occur at the HS2 Crewe IMD. In some locations lighting of new road junctions and roundabouts would be required, however as these would generally sit in proximity to areas/roads which are already lit throughout the night these are not considered as part of the night time assessment.

Other mitigation measures

11.5.61 The permanent effects of the Proposed Scheme on landscape and visual receptors have been substantially reduced through incorporation of the measures described in this section. Effects in year 1 of operation may be further reduced by establishing planting early in the construction programme. Additional planting will be considered as part of the ongoing development of the design. This would provide additional screening and greater integration of the Proposed Scheme into the landscape. However, no other mitigation measures are considered practicable due to the high visibility of elements of the Proposed Scheme and the sensitivity of the surrounding receptors.

Summary of likely residual significant effects

11.5.62 In most cases, significant effects will reduce over time as the proposed mitigation planting matures and reaches its designed intention. However, the following significant effects would remain following year 15 of operation:

- major adverse significant landscape effects in relation to the Madeley Valley LCA due to the presence of the Checkley Brook viaduct and associated elevated overhead line equipment continuing to create a locally large degree of change to the valley's tranquil rural landscape character;
- moderate adverse significant landscape effects in relation to the Blakenhall Lower Farms and Woods LCA due to the presence of the Proposed Scheme as it converges with and continues to run parallel to the WCML and continuing to

create a locally large degree of change to the open, relatively tranquil rural landscape character;

- moderate adverse significant landscape effects in relation to the Shavington/Crewe Outer Fringe Lower Farms and Woods LCA due to the presence of the varied and complex elements of the Proposed Scheme, including the realignments to Newcastle Road, Casey Lane and Weston Lane intensifying the perception of severance caused by the WCML and continuing to create a locally large degree of change to the open, relatively tranquil rural landscape character;
- moderate adverse significant effects in relation to the Crewe Urban Fringe LCA due to the presence of the Proposed Scheme including realignments to the A500 Shavington Bypass, Crotia Mill Lane, and the B5071 Jack Mills Way/Crewe Road and the HS2 Crewe IMD. The scale and prominence of the new infrastructure would intensify the effects of the WCML and perceptions of severance caused by the recently constructed B5071 Jack Mills Way and A5020 David Whitby Way. The HS2 Crewe IMD would completely alter the landscape of the former farmland between the Basford Hall sidings and the B5071 Jack Mills Way;
- moderate adverse significant visual effects on recreational receptors using Checkley cum Wrinehill Footpath 4 east of Turncocks Lane and receptors living nearby (viewpoint 024.03.019). This is due to the Checkley North embankment which would remain a prominent feature;
- moderate adverse significant visual effects on receptors living on Den Lane and Mill Lane near Higher Den Farm and recreational receptors using Blakenhall Bridleway 9 and Blakenhall Footpath 9 (viewpoints 025-02-001 and 025-02-006). This is due to the proximity and visibility of the Den Lane realignment and Den Lane viaducts, embankments, retaining walls and associated overhead line equipment. Although substantial mitigation planting is proposed for this area, these elements would remain prominent in views;
- moderate adverse significant visual effects would remain for receptors living on the western edge of Wychwood Park and users of Chorlton Footpaths 3 and 10, Wychwood Park golf course, Waybutt Lane (viewpoints 026-03-002 and 026-02-006). This is due to the proximity and visibility of the varied and complex structures required as the WCML and Proposed Scheme as they merge and run parallel and in proximity to each other towards Crewe;
- moderate adverse significant visual effects would remain for recreational receptors using Chorlton Footpaths 1, 7, Hough Footpath 8 and Hough common (viewpoint 026-03-010). This is due to the prominence and visibility of the varied and complex elements of the Proposed Scheme, including the Crewe south retained cut and Chorlton retaining walls;
- major adverse significant effects would remain for receptors living along Newcastle Road (viewpoint 026-02-022). This is due to the prominence and visibility of the realigned section of Newcastle Road and the South Crewe

auto-transformer feeder station, which would completely change the outlook from this location;

- moderate adverse significant visual effects would remain for receptors living on Back Lane and Newcastle Road and recreational receptors using Basford Footpath 7 and National Cycle Route 70 (viewpoints 027-02-001 and 026-03-028). This is due to the proximity and visibility of the realigned Newcastle Road, which would remain prominent in views despite the maturing mitigation planting;
- major adverse significant visual effects on receptors living along Weston Lane (viewpoint 027-02-012). This is due to the proximity and visibility of the various and complex elements of the Proposed Scheme, including the HS2 Crewe IMD access spurs and realigned sections of Weston Lane and A500 Shavington Bypass, which would remain prominent in views despite the maturing mitigation planting; and
- major adverse significant visual effects on receptors at Dairy House; residents living close to junction of Weston Lane with Casey Lane and on recreational receptors using Basford Footpath 1 (viewpoint 027-02-014). This is due to the proximity and visibility of the various and complex elements of the Proposed Scheme, including the realigned sections of Weston Lane and Shavington Bypass and the realigned section of Casey Lane, which would remain prominent in views despite the maturing mitigation planting.

12 Socio-economics

12.1 Introduction

12.1.1 This section provides a summary of the environmental baseline and likely economic and employment effects during construction and operation of the Proposed Scheme within the South Cheshire area.

12.1.2 The need for a socio-economic assessment results from the potential for the Proposed Scheme to affect:

- existing businesses and community organisations and thus the amount of local employment;
- local economies including employment; and
- planned growth and development.

12.1.3 The beneficial and adverse socio-economic effects of the Proposed Scheme are reported at two different levels: route-wide and by community area. Effects on levels of employment are reported at a route-wide level in Volume 3. Localised effects on businesses and observations on potential local economic effects are reported in this section.

12.1.4 Engagement with CEC has been undertaken. The purpose of this engagement has been to obtain relevant baseline information. Engagement with CEC will continue as part of the development of the Proposed Scheme.

12.1.5 Maps showing the location of the key environmental features and the key construction and operation features of the Proposed Scheme can be found in the Volume 2, CA5 Map Book.

Construction

12.1.6 The proposed construction works would have the following relevance in terms of socio-economics in relation to:

- premises demolished, with their occupants and employees needing to relocate to allow for construction of the Proposed Scheme; and
- potential employment opportunities arising from construction in the local area (including in adjacent community areas).

Operation

12.1.7 The operation of the Proposed Scheme would have relevance in terms of socio-economics, in relation to the potential employment opportunities created by new business opportunities.

12.2 Scope, assumptions and limitations

12.2.1 The assessment scope, key assumptions and limitations for the socio-economics assessment are set out in the draft SMR and Volume 1.

12.3 Environmental baseline

Introduction

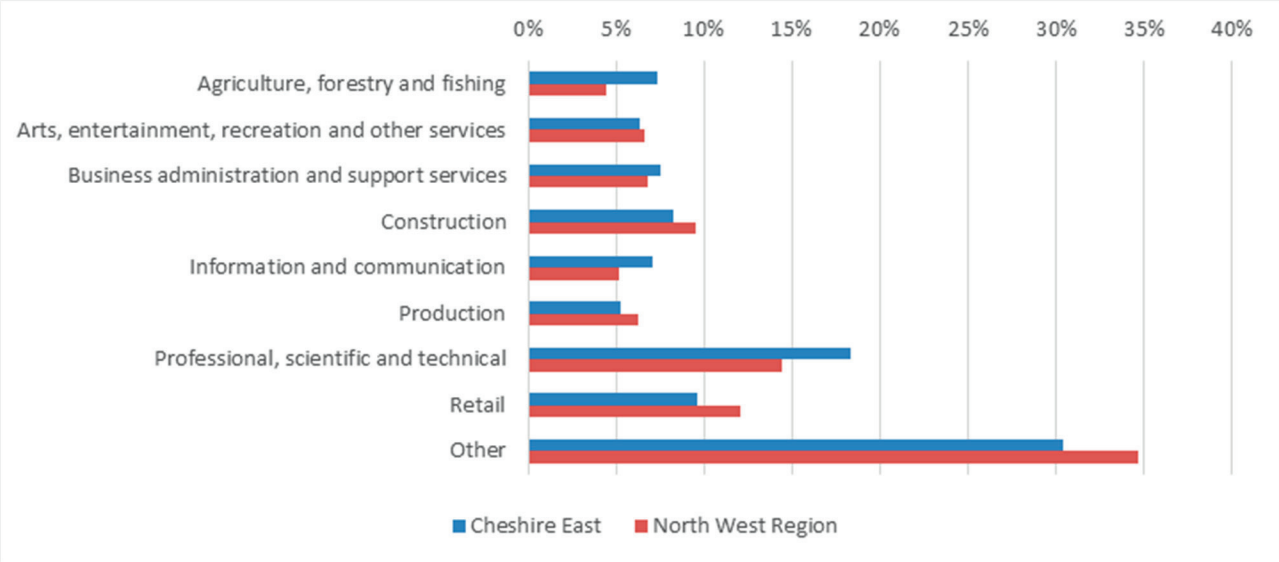
12.3.1 The following provides a brief overview in terms of employment, economic structure, labour market, and business premises availability within the South Cheshire area.

12.3.2 The South Cheshire area lies within the administrative area of CEC within the North West region. The area also falls within the Cheshire and Warrington Local Enterprise Partnership (LEP) area[75].

Business and labour market

12.3.3 Within the CEC area there is a wide spread of business types reflecting a diverse range of commercial activities. The professional, scientific and technical sector accounts for the largest proportion of businesses (18%), with retail the second largest (10%) followed by construction (8%). This is shown in 6[76]. For comparison within the North West region, the largest sectors were professional, scientific and technical (14 %), followed by retail (12%) and construction (10%)[77].

Figure 6: Business sector composition in the CEC area and the North West



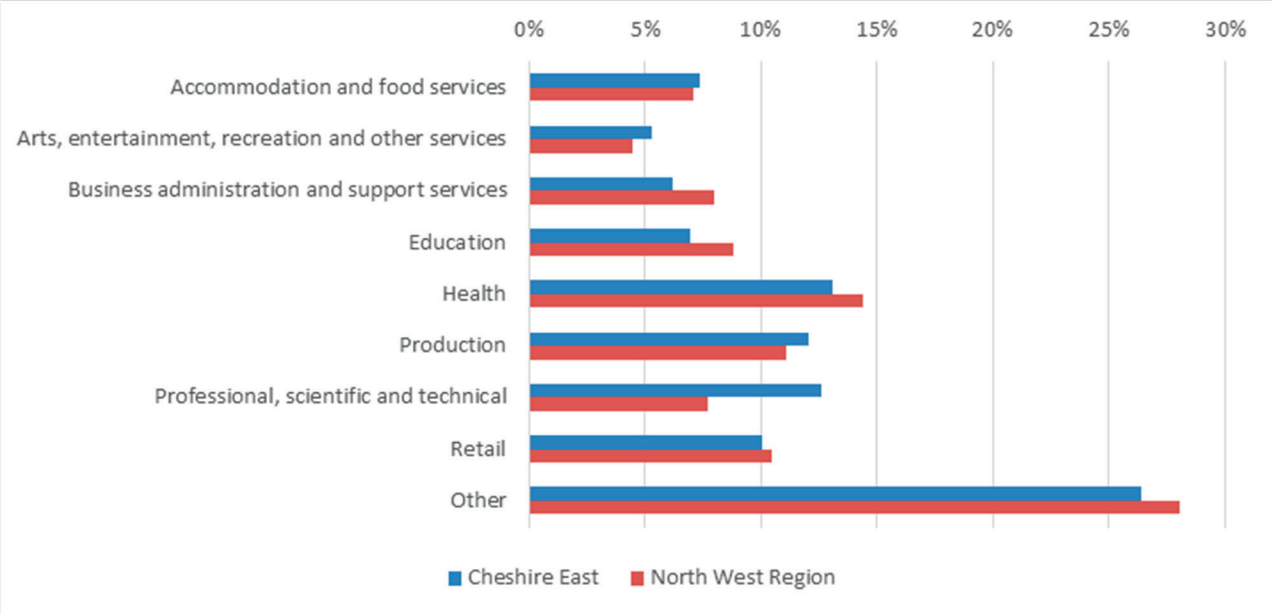
Source: Office for National Statistics; UK Business: Activity, Size and Location 2014; accessed: 11 January 2016.

12.3.4 In 2014[78], approximately 185,000 people worked in the CEC area. According to the Office for National Statistics (ONS) Business Register and Employment Survey 2014, the top five sectors in terms of share of employment in the CEC area are: health (13%); professional, scientific and technical (13%); production (12%); retail (10%) and accommodation and food services (7%). These compare with the top five sectors for

[75] Cheshire and Warrington Local Enterprise Partnership (April 2016), European Structural and Investment Funds Strategy 2014-2020.
[76] The figure presents the proportion of businesses within each business sector in the CEC area but not the proportion of employment by sector.
[77] Office for National Statistics UK Business: Activity, Size and Location 2014. Accessed online at: https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/ukbusinessactivitysizeandlocation ; Accessed: 11 January 2016. Please note 2014 BRES companies data has been presented to provide an appropriate comparison with 2014 BRES Employment data.
[78] Office of National Statistics, (2014) Business Register and Employment Survey; Available online at: http://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/businessregisterandemploymentsurveybresprovisionalresults/previousReleases Accessed 11 January 2016.

the North West region, which are: health (14%); production (11%); retail (10%); education (9%) and business administration and support services (8%). This is shown in 7[79].

Figure 7: Employment by Industrial Sector in the CEC area and the North West



Source: Office of National Statistics, Business Resister and Employment Survey 2014; accessed: 11 January 2016.

12.3.5 According to the Annual Population Survey (2016)[80], the employment rate[81] within the CEC area was 77% (185, 000 people), which is higher than that recorded for both the North West region (71%) and England (74%). In 2016, unemployment[82] in the CEC area was 3%, which was lower than the North West (5 %) and England (5%).

12.3.6 According to the Annual Population Survey (2015)[83], 38% of CEC's residents aged 16-64 were qualified to National Vocational Qualification Level 4 (NVQ4) and above, compared to 33% in the North West and 37% in England, while 8% of residents had no qualifications, which was lower than that recorded for North West (10%) but the same as England (8%).

Property

12.3.7 A review of employment land in 2012 identified a need for 15.4ha per year to 2030 for general business land in the CEC area[84].

[79] Office of National Statistics, (2014) Business Register and Employment Survey; Accessed: 11 January 2016.
[80] Annual Population Survey, (2016), NOMIS, Accessed: 25 July 2016
[81] The proportion of working age (16-64 year olds) residents that is in employment. Employment comprises the proportion of the total resident population who are 'in employment'.
[82] Refers to people without a job who were available to start work in the two weeks following their interview and who had either looked for work in the four weeks prior to interview or were waiting to start a job they had already obtained. As the unemployed form a small percentage of the population, the APS unemployed estimates within local authorities are based on very small samples so for many areas would be unreliable. To overcome this ONS has developed a statistical model that provides better estimates of total unemployed for unitary authorities and local authority districts (unemployment estimates for counties are direct survey estimates), NOMIS.
[83] Annual Population Survey, (2015), NOMIS, Accessed: 26 April 2016.
[84] Arup (2012), Cheshire East Employment Land Review, Based on upper range (includes 30% flexibility factors) covering 2009-2030.

12.3.8 The average vacancy rate for industrial and warehousing property in the CEC area in May 2016 has been assessed as 16.1% based on marketed space against known stock[85].

12.4 Effects arising during construction

Avoidance and mitigation measures

12.4.1 Businesses displaced by the Proposed Scheme would be compensated in accordance with the National Compensation Code. HS2 Ltd recognises the importance of displaced businesses being able to relocate to alternative premises and, would therefore, provide additional support over and above statutory requirements to facilitate this process.

12.4.2 The construction of the Proposed Scheme offers considerable opportunities to businesses and residents along the line of route in terms of supplying goods and services and obtaining employment. HS2 Ltd is committed to working with its suppliers to build a skilled workforce that fuels further economic growth across the UK.

Assessment of impacts and effects

12.4.3 Businesses directly affected (i.e. those that lie within land that would be required for the construction of the Proposed Scheme) are reported in groups where possible, to form defined resources, based on their location and operational characteristics. A group could contain either one or a number of businesses reflecting the fact that a building may have more than one occupier or that similar businesses/resources are clustered together.

12.4.4 Three business properties lie within the South Cheshire area, and would be directly affected by the Proposed Scheme, however no non-agricultural employment has been identified with these locations. Hence there are no significant direct effects on non-agricultural employment within the area. The Proposed Scheme is not anticipated to result in the displacement or possible loss of jobs within the South Cheshire area. Effects on agricultural businesses are reported separately in Section 4, Agriculture, forestry and soils, and their total employment effects are to be reported in Volume 3 within the formal EIA Report.

12.4.5 South Crewe ATFS main compound and 15 satellite construction compounds for the Proposed Scheme would be located within the South Cheshire area.

12.4.6 These sites could result in the creation of up to 5,800 person years of construction employment[86] opportunities, equivalent to 580 full-time equivalent permanent jobs[87], which, depending on skill levels required and the skills of local people, are potentially accessible to residents in the locality and to others living further afield. The impact of

[85] Vacant space is based on marketed space identified from Estates Gazette data (EGi); stock data is taken from information supplied by the Valuation Office (VOA).
[86] Construction labour is reported in construction person years, where one construction person year represents the work done by one person in a year composed of a standard number of working days.
[87] Based on the convention that 10 employment years is equivalent to one full time equivalent job

the direct construction employment creation has been assessed as part of the route-wide assessment (Volume 3, Route-wide effects).

12.4.7 Direct construction employment created by the Proposed Scheme could also lead to opportunities for local businesses to supply the project or to benefit from expenditure of construction workers. The impact of the indirect construction employment creation has been assessed as part of the route wide assessment (Volume 3, Route-wide effects).

12.4.8 Any combined effects of noise, vibration, visual, air quality or HGV congestion impacts and isolation on businesses will be reported in the formal EIA Report.

Other mitigation measures

12.4.9 No other mitigation measures have currently been identified.

Summary of likely residual significant effects

12.4.10 Any likely residual significant socio-economic effects will be reported in the formal EIA Report.

12.5 Effects arising during operation

Avoidance and mitigation measures

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

Assessment of impacts and effects

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

12.5.3 The Proposed Scheme would create direct and wider operation employment opportunities across the route. Initial estimates suggest that 300 HS2-related jobs would be created at the HS2 Crewe IMD. Some of these employment opportunities will be accessible to residents in the locality, given the transport accessibility of the area within the Crewe travel to work area.

12.5.4 Operational effects are assessed and reported at a route-wide level in Volume 3 Route-wide effects.

12.5.5 Any combined effects of noise, vibration, visual, air quality or HGV congestion impacts and isolation on businesses will be reported in the formal EIA Report.

Other mitigation measures

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

Summary of likely residual significant effects

12.5.7 Any likely residual significant socio-economic effects will be reported in the formal EIA Report.

13 Sound, noise and vibration

13.1 Introduction

13.1.1 This section reports the initial assessment of the potential likely noise and vibration significant effects arising from the construction and operation of the Proposed Scheme within the South Cheshire area on:

- people, primarily where they live ('residential receptors') in terms of individual dwellings and on a wider community basis, including any shared community open areas[88]; and
- community facilities such as schools, hospitals, places of worship, and also commercial properties such as offices and hotels, collectively described as 'non-residential receptors' and 'quiet areas'[89].

13.1.2 In this assessment 'sound' is used to describe the acoustic conditions which people experience as a part of their everyday lives. The assessment considers how those conditions may change through time and how sound levels and the acoustic character of an area is likely to be modified through the introduction of the Proposed Scheme. Noise is taken as unwanted sound and hence adverse effects are noise effects and mitigation is, for example, by noise barriers.

13.1.3 Effects can either be temporary from construction or permanent from the operation of the Proposed Scheme. These effects may be direct, resulting from the construction or operation of the Proposed Scheme, and/or indirect, resulting from changes in traffic patterns on existing roads or railways that result from the construction or operation of the Proposed Scheme.

13.1.4 Consistent with Government noise policy[90] and the approach taken to the environmental impact assessment of HS2 Phase One this working draft EIA Report reports how, in the context of Government sustainable development policy, the Proposed Scheme, through the effective management and control of noise would:

- avoid significant adverse impacts on health and quality of life from the Proposed Scheme;
- mitigate and minimise adverse impacts on health and quality of life from the Proposed Scheme; and
- where possible, contribute to the improvement of health and quality of life.

13.1.5 Engagement with CEC has been undertaken. The purpose of this engagement has been to obtain relevant information regarding residential and non-residential

[88] 'Shared community open areas' are those that the National Planning Practice Guidance identifies may partially offset a noise effect experienced by residents at their dwellings and are either a) relatively quiet nearby external amenity spaces for sole use by a limited group of residents as part of the amenity of their dwellings or b) a relatively quiet external publicly accessible amenity space (e.g. park or local green space) that is nearby.
[89] Quiet areas are defined in the draft Scope and Methodology Report as either Quiet Areas as identified under the Environmental Noise Regulations or are resources which are prized for providing tranquillity.
[90] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf

resources and existing baseline information. Engagement with CEC will continue as part of the development of the Proposed Scheme.

13.1.6 Maps showing the location of the key environmental features and the key construction and operation features of the Proposed Scheme can be found in the Volume 2, CA5 Map Book.

13.2 Scope, assumptions and limitations

13.2.1 The approach to assessing sound, noise and vibration and appropriate mitigation are outlined in Volume 1. The scope and methodology is defined in the draft SMR.

13.2.2 The effects of construction sound, noise and vibration are assessed qualitatively, based on construction worksite locations, construction routes, initial construction estimates and professional judgement. No quantitative assessment has been undertaken at this stage; the quantitative assessment will be reported in the formal EIA Report.

13.2.3 The effects on operational sound, noise and vibration are assessed quantitatively. As baseline information is limited at this stage, the quantitative assessment will be reported in the formal EIA Report.

13.3 Environmental baseline

13.3.1 The area is characterised as predominantly rural, becoming more urbanised towards Crewe. The three main roads in the area are Newcastle Road, which runs between Weston and Hough, the A531 Newcastle Road and the A500 Shavington Bypass. The WCML between Stafford and Crewe runs adjacent to the Proposed Scheme for the majority of this area. Sound from the railway and from local and distant roads dominate the sound environment for most residential locations within this area.

13.3.2 Sound levels close to the WCML are high during the day, with little reduction at night. The daytime and night time sound levels are lower at greater distances from the WCML and local roads.

13.3.3 It is likely that the majority of receptors adjacent to the Proposed Scheme are not currently subject to appreciable vibration. No baseline vibration monitoring has been undertaken as part of the assessment presented in this report. The effects of vibration at all receptors has been assessed using the absolute vibration criteria defined in the draft SMR.

13.4 Effects arising during construction

Avoidance and mitigation measures

13.4.1 The assessment assumes the implementation of the principles and management processes set out in the draft CoCP, which are:

- best practicable means (BPM) as defined by the Control of Pollution Act 1974 (CoPA) and Environmental Protection Act 1990 (EPA), which would be applied during construction activities to minimise noise (including vibration) at neighbouring residential properties;
- as part of BPM, mitigation measures are applied in the following order:

  - noise and vibration control at source: for example the selection of quiet and low vibration equipment, review of construction methodology to consider quieter methods, location of equipment on site, control of working hours, the provision of acoustic enclosures and the use of less intrusive alarms, such as broadband vehicle reversing warnings;
  - screening: for example local screening of equipment or perimeter hoarding;
  - where, despite the implementation of BPM, the noise exposure exceeds the criteria defined in the draft CoCP, noise insulation or ultimately temporary re-housing would be offered in accordance with the draft CoCP's noise insulation and temporary re-housing policy;

- lead contractors would seek to obtain prior consent from the relevant local authority under Section 61 of the CoPA for the proposed construction works. The consent application would set out BPM measures to minimise construction noise, including control of working hours, and provide a further assessment of construction noise and vibration including confirmation of noise insulation/temporary re-housing provision;
- contractors would undertake and report such monitoring as is necessary to assure and demonstrate compliance with all noise and vibration commitments. Monitoring data would be provided regularly to and be reviewed by the nominated undertaker and would be made available to the local authorities; and
- contractors would be required to comply with the terms of the CoCP and appropriate action will be taken by the nominated undertaker as required to ensure compliance.

13.4.2 Noise insulation would be offered for qualifying buildings as defined in the noise insulation and temporary re-housing policy in the draft CoCP. Noise insulation or ultimately temporary re-housing would avoid residents being significantly affected by levels of construction noise inside their dwellings. Further work is being undertaken to provide an estimate of the buildings that are likely to qualify for such measures, which will be reported in the formal EIA Report.

13.4.3 Qualification for noise insulation and temporary re-housing would be confirmed, as required in the draft CoCP, as part of seeking prior consent from the local authorities under Section 61 of the CoPA. Qualifying buildings would be identified, as required in the draft CoCP so that noise insulation can be installed, or any temporary re-housing provided, before the start of the works predicted to exceed noise insulation or temporary re-housing criteria. Noise insulation, where required, would be installed as early as possible to reduce internal sound levels from construction activities and also when the Proposed Scheme comes into operation.

Assessment of impacts and effects

13.4.4 Potential construction noise effects could occur due to the increase in noise levels around the communities closest to the Proposed Scheme in the following locations, as a result of the construction works illustrated on the construction Map Series CT-05 (Volume 2, CA5 Map Book):

- Higher Den Farm, occupants of residential properties close to Higher Den Farm on Den Lane, arising from construction activities such as earthworks and track base installation;
- Mill Lane End, occupants of residential properties on Mill Lane, located closest to the Proposed Scheme, arising from construction activities such as bridges/viaducts, earthworks and track base installation;
- Lane End Farm and Dairy Farm, occupants of residential properties on Chorlton Lane, located closest to the Proposed Scheme, arising from construction activities such as bridges/viaducts, earthworks and track base installation;
- Chorlton, occupants of residential properties on Chiltern Close, Henley Road, St. Clements Court and Westwood Close, located closest to the Proposed Scheme, arising from construction activities such as bridges/viaducts, earthworks and track base installation;
- Basford, occupants of residential properties on Larch Avenue and Weston Lane, located closest to the Proposed Scheme, arising from construction activities such as bridges/viaducts, earthworks and track base installation;
- Casey Lane, occupants of residential properties on Casey Lane arising from construction activities such as road works, earthworks and track base installation;
- Newcastle Road, occupants of residential properties on A531 Newcastle Road, arising from construction activities such as road works, bridges/viaducts, earthworks and track base installation; and
- Basford West, occupants of residential properties on Crewe Road, Gresty Green Road and Hunter Avenue, arising from construction activities such as road works, earthworks and track base installation.

13.4.5 Construction traffic has the potential to cause adverse noise effects on occupants of residential properties through the additional traffic generated on local roads. The following routes have been identified on a precautionary basis as having the potential for an adverse noise effect on occupants of associated residential communities:

- Checkley Lane between the Proposed Scheme and A51 London Road;
- Den Lane between the Proposed Scheme and the A531 Newcastle Road at Wrinehill;
- Den Lane/Wrinehill Road and the B5071 Bridge Street/Wynbunbury Road, to the west of the Proposed Scheme, to the A51 London Road at Walgherton;
- Chorlton Lane/Newcastle Road, between the Proposed Scheme to the A531 Newcastle Road, south of Weston; and
- Weston Lane, to the east of the Proposed Scheme, through Weston to A531 Newcastle Road.

13.4.6 Track laying, power system and signalling installation works would be unlikely to result in significant construction noise effects, given the short duration close to any communities and the presence of the permanent noise barriers.

Other mitigation measures

13.4.7 Further work is being undertaken to confirm the likely significant effects and identify any site-specific mitigation, or amendment to construction routes considered necessary in addition to the general measures set out in the draft CoCP. Any site-specific mitigation will be presented in the formal EIA Report and will include an estimate of the number of properties that may qualify for noise insulation or temporary re-housing under provisions set out in the draft CoCP.

Summary of likely residual significant effects

13.4.8 Further work is being undertaken to confirm significant construction noise and vibration effects, including any temporary effects from construction traffic. Non-residential receptors identified at this stage as potentially subject to construction noise or vibration effects will be further considered, where necessary, on a receptor-by-receptor basis. Any further assessment will be reported in the formal EIA Report.

13.5 Effects arising from operation

Avoidance and mitigation measures

13.5.1 The development of the Proposed Scheme has sought to keep the route as low as reasonably practicable and away from main communities. These avoidance measures would protect many communities in this area from likely significant noise or vibration effects.

Airborne noise

13.5.2 HS2 trains are assumed to be quieter than the relevant current European Union specifications, as assumed for HS2 Phase One. Assuming quieter trains than the Technical Specification for Interoperability (TSI) Noise is consistent with Phase One and will be detailed in a technical appendix to the formal EIA Report. This will include reduction of aerodynamic noise from the pantograph that otherwise would occur above 300kph (186mph) with current pantograph designs, drawing on proven technology in use in East Asia. The track would be specified to reduce noise, as would the maintenance regime. Overall these measures would reduce noise emissions by approximately 3dB at 360kph compared to a current European high speed train operating on the new track.

13.5.3 The Proposed Scheme would incorporate noise barriers in the form of landscape earthworks and/or noise fence barriers to avoid or reduce significant airborne noise effects. The assessment has been based on the assumption of noise fence barriers that are acoustically absorbent on the railway side and are located 5m to the side of the outer rail. The envisaged noise barrier locations based upon the currently available information are shown on the SV-01 Map Series (Volume 2, CA5 Map Book).

13.5.4 In practice, barriers may differ from this description whilst maintaining the required acoustic performance. For example, where noise barriers are in the form of landscape earthworks they need to be higher above rail level to achieve similar noise attenuation

to the noise fence barrier because the crest of the earthwork would be further than 5m from the outer rail.

13.5.5 Noise effects are reduced in other locations along the route by landscape earthworks provided to avoid or reduce significant visual effects and engineering structures such as cuttings and safety fences on viaducts (where noise barriers are not required).

13.5.6 Significant noise effects from the operational static sources, such as line-side equipment, would be avoided through their design and the specification of noise emission requirements.

13.5.7 Noise insulation measures would be offered for qualifying buildings as defined in the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 (the Noise Insulation Regulations). The assessment reported in this section provides an estimate of the buildings that are likely to qualify under the Noise Insulation Regulations based upon the currently available information. Qualification for noise insulation under the Noise Insulation Regulations would be formally identified and noise insulation offered, should the Proposed Scheme become operational. Where noise insulation is required, as well as improvements to noise insulation of windows facing the railway, ventilation would be provided so that windows can be kept closed to protect internal sound levels.

13.5.8 Noise insulation would avoid any residual significant effects on health and quality of life arising inside dwellings taking into account mitigation incorporated into the design of the Proposed Scheme.

13.5.9 Following Government's National Planning Practice Guidance[91], where the noise from the use of the Proposed Scheme measured outside a dwelling exceeds the Interim Target defined by the World Health Organisation's[92] (WHO) Night Noise Guidelines for Europe, residents are considered to be significantly affected by the resulting noise inside their dwelling. The effect on people at night due to the maximum sound level as each train passes has also been assessed[93]. The Interim Target is a lower level of noise exposure than the Regulations trigger threshold for night noise. In these particular circumstances, where night time noise levels for the use of new or additional railways authorised by the Bill are predicted following the methodology set out in the Regulations to exceed 55dB[94], or the maximum noise level (dependent on the number of train passes) as a train passes exceeds the criterion, noise insulation would be offered for these additional buildings.

Ground-borne noise and vibration

13.5.10 Significant ground-borne noise or vibration effects would be avoided or reduced through the design of the track and track-bed.

[91] National Planning Practice Guidance – Noise. Available online at: http://planningguidance.planningportal.gov.uk.
[92] World Health Organization (2009), Night time Noise Guidelines for Europe.
[93] During the night (2300-0700) a significant effect is also identified where the Proposed Scheme results in a maximum sound level at the façade of a building at or above: 85dB LpAFmax (where the number of train pass-bys exceeding this value is less than or equal to 20); or 80dB LpAFmax (where the number of train pass-bys exceeding this value is greater than 20).
[94] Equivalent continuous level, LpAeq,23:00-07:00 measured without reflection from the front of buildings.

Assessment of impacts and effects

13.5.11 Map Series SV-01 (Volume 2, CA5 Map Book) indicate the likely long-term daytime sound level (defined as the equivalent continuous sound level from 07:00 to 23:00 or LpAeq,day) from HS2 operations alone. The contours are shown in 5dB steps from 50dB to 70dB. With the train flows described in Volume 1, the night time sound level (defined as the equivalent continuous sound level from 23:00 to 07:00 or LpAeq,night) from the Proposed Scheme would be approximately 10dB lower than the daytime sound level. The 50dB contour, therefore, indicates the distance from the Proposed Scheme at which the night time sound level would be 40dB. This contour represents where the lowest observed community noise effects would be expected to occur during the day (with respect to annoyance) and night (with respect to sleep disturbance). It is generally unlikely that there would be any adverse noise effects outside of the area within this contour. With regard to sleep disturbance the assessment has also taken account of the maximum sound levels generated by each train pass by.

13.5.12 Residential receptors within the daytime 65dB contour, and therefore, the night time 55dB contour, have been identified as being likely to experience a significant adverse effect from Proposed Scheme noise alone. This is in line with the daytime threshold in the Noise Insulation Regulations and the Interim Target defined in the WHO's Night Noise Guidelines.

13.5.13 The potential for significant noise effects on communities in areas between the 50dB and 65dB daytime sound contours, or 40dB and 55dB night time contours, would be dependent on the baseline in that area and the change in sound level brought about by the Proposed Scheme.

13.5.14 The criteria used for the working draft EIA Report to assess whether an effect is potentially significant include factors such as the number and magnitude of impacts in a community as well as the existing sound environment. The further significance criteria set out in the draft SMR would be taken into account in the formal EIA Report. These include the character of the existing sound environment, any unique features of the Proposed Scheme's sound or impacts, and the potential combined impacts of sound and vibration.

13.5.15 In the case of PRoW they are by their nature transitory routes, with users not staying in any one location for long periods. Train sound from the Proposed Scheme would be intermittent and its level would vary as the PRoW moves closer to and further from the Proposed Scheme. Noise effects would generally be reduced by the landscape earthworks envisaged to reduce visual impact of the Proposed Scheme and envisaged noise mitigation to protect other receptors. No significant noise effects have, therefore, been identified on PRoW within this area.

13.5.16 A number of potential minor ground-borne noise and vibration impacts have been forecast at a small number of properties very close to the route. Taking account of the number and minor magnitude of the impacts, and the experience of HS1, no significant effects have been identified. Further assessment would be undertaken for the formal EIA Report to confirm whether the impacts currently forecast are likely to occur. Vibration from the operation of the Proposed Scheme would present no risk of any building damage.

13.5.17 It is currently anticipated that there would be no potentially significant noise or vibration effects arising from changes to existing roads. This will be confirmed in the formal EIA Report.

Other mitigation measures

13.5.18 Further work is being undertaken to confirm the extent of the noise mitigation included within the Proposed Scheme, which will be confirmed within the formal EIA Report.

Summary of likely residual significant effects

13.5.19 The envisaged mitigation, including landscape earthworks and noise barriers, described in this chapter and presented in Map Series SV-01 (Volume 2, CA5 Map Book), would substantially reduce the potential airborne sound impacts and noise effects that would otherwise arise from the Proposed Scheme. Nonetheless, this initial assessment has identified potential significant adverse airborne noise effects due to increased noise levels around the following communities:

- Higher Den Farm: occupants of residential properties close to Higher Den Farm on Den Lane, located closest to the Proposed Scheme, identified by OSV05-C01 on Map SV-01-119;
- Mill Lane End: occupants of residential properties on Mill Lane, located closest to the Proposed Scheme, identified by OSV05-C02 on Map SV-01- 119;
- Lane End Farm and Dairy Farm, Chorlton: occupants of residential properties on Chorlton Lane, located closest to the Proposed Scheme, identified by OSV05-C03 on Map SV-01- 120;
- Chorlton: occupants of residential properties on Chiltern Close, Henley Road, St. Clements Court and Westwood Close, located closest to the Proposed Scheme, identified by OSV05-C04 on Map SV-01-120; and
- Basford: occupants of residential properties on Larch Avenue and Weston Lane, located closest to the Proposed Scheme, identified by OSV05-C05 on Map SV-01-121.

13.5.20 The initial assessment indicates that, on a precautionary basis, the forecast noise from long-term railway operation may exceed the daytime threshold set by the Noise Insulation Regulations, the night time Interim Target identified in the WHO Night Noise Guidelines for Europe (2009) or the maximum noise levels criteria set out in the WHO Guidelines for Community Noise (1999), at individual residential properties closest to the Proposed Scheme in the vicinity of Blakenhall. These properties are identified on Map Series SV-01 (Volume 2, CA5 Map Book).

13.5.21 Further assessment work is being undertaken to confirm operational sound and vibration significant effects, especially those at non-residential receptors and quiet areas (as necessary, on a receptor-by-receptor basis). This will be reported in the formal EIA Report, which will present baseline levels, forecasts for the Proposed Scheme and the change in sound levels brought about by the Proposed Scheme both as impact plans and tables. There would be no risk of any building damage due to vibration from the operation of the Proposed Scheme.

13.5.22 Map Series SV-01 (Volume 2, CA5 Map Book) shows the draft non-residential locations to be considered in the sound, noise and vibration assessment as part of the formal EIA Report. This will be developed further incorporating consultation feedback and ongoing stakeholder engagement.

14 Traffic and transport

14.1 Introduction

14.1.1 This traffic and transport section describes the likely impacts on all forms of transport and the consequential effects on transport users arising from the construction and operation of the Proposed Scheme through the South Cheshire area.

14.1.2 The main issues associated with traffic and transport are expected to be increased traffic as a result of the construction of the Proposed Scheme, road diversions and realignments, temporary and permanent road closures, some temporary disruption to WCML train service patterns in the vicinity of Crewe and temporary alternative routes and permanent realignments of PRoW. There is likely to be an operational impact as a result of additional passenger trips at Crewe Station and the proposed HS2 Crewe IMD within this area, which will be reported in the formal EIA Report.

14.1.3 Engagement with CEC and Highways England has been undertaken. An important focus of this engagement has been to obtain relevant baseline information. Engagement with these and other relevant stakeholders will continue as part of the design development of the Proposed Scheme.

14.1.4 Maps showing the location of the key environmental features and the key construction and operation features of the Proposed Scheme can be found in the Volume 2, CA5 Map Book.

14.2 Scope, assumptions and limitations

14.2.1 The scope, key assumptions and limitations for the traffic and transport assessment are set out in Volume 1 and the draft SMR.

14.2.2 The study area includes all roads affected by the Proposed Scheme: the M6, the A500 Newcastle Road/Shavington Bypass, the A534 Crewe Road, the A531 Newcastle Road, A51 Nantwich Bypass, the A51 London Road, the A5020 Weston Road/University Way/David Whitby Way, the A532 Weston Road, the B5071 Crewe Road/Jack Mills Way/Gresty Road and local roads serving the settlements of Shavington, Weston, Chorlton, Hough, Wybunbury and Blakelow.

14.2.3 The effects on traffic and transport are assessed qualitatively, based on construction routes, initial estimates of construction traffic and professional judgement.

14.2.4 Traffic survey data has been obtained during periods in which some road closures were in place. However, the baseline data has been supplemented by existing traffic survey data supplied by CEC undertaken when such road closures were not in place.

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

14.3 Environmental baseline

Existing baseline

14.3.1 Existing conditions in the area have been determined through site visits, traffic and transport surveys and liaison with CEC (including the provision of information on public transport, PRoW and accident data) and desktop analysis.

14.3.2 Traffic surveys of roads crossing the route or potentially affected by the Proposed Scheme were undertaken in November and December 2015 and February and March 2016, comprising automatic traffic counts, junction turning counts and queue surveys. This data has been supplemented by existing traffic data from other sources where available including from CEC. Assessment of the data indicates that the peak hours in the study area are 08:00-09:00 and 17:00-18:00.

14.3.3 PRoW surveys were undertaken in June 2016, to establish their nature and usage by non-motorised users (pedestrians, cyclists and equestrians). The surveys included all PRoW and roads that cross the route of the Proposed Scheme and any additional PRoW and roads that may be affected by the Proposed Scheme. The majority of surveys were undertaken during the weekend when usage is expected to be highest, but some were undertaken on a weekday where routes may be influenced by commuting and other localised uses.

14.3.4 The Proposed Scheme would intersect 14 PRoW, although others in the area could also be affected. The Proposed Scheme would also cross seven roads and roadside footways including Checkley Lane, Den Lane, Chorlton Lane, Newcastle Road, Casey Lane, Weston Lane and the A500 Shavington Bypass.

14.3.5 There is one strategic road that passes through the area, the M6. The M6 runs in a north to south alignment to the east of Crewe and connects Crewe with Newcastle-under-Lyme and Stoke-on-Trent in this locality. The major access to the motorway network in this area is at junction 16 of the M6.

14.3.6 There are five primary 'A' roads: the A500 Newcastle Road/Shavington Bypass provides an east to west connection through the area and links Nantwich to the south of Crewe and the M6 at junction 16; the A5020 Weston Road and A532 Weston Road, which pass through Crewe town centre; the A534 Crewe Road, which connects Crewe with Nantwich and Sandbach; and the A531 Newcastle Road, which connects Crewe with the settlements of Chorlton, Betley, Wrinehill and Madeley Heath. The strategic and primary road network, particularly around Crewe, can get busy at peak times and delays can be experienced.

14.3.7 The main local roads affected by the Proposed Scheme are: the A5020 University Way/David Whitby Way, which traverses the eastern boundary of Crewe and connects the A534 Crewe Road with the A500 Newcastle Road/Shavington Bypass; the A51 Nantwich Bypass, which connects a number of primary 'A' roads to the west of Crewe; and the B5071 Crewe Road/Jack Mills Way/Gresty Road, which connects the A500 Shavington Bypass with central parts of Crewe. Other local roads affected by the Proposed Scheme include a section of the Crewe Road parallel to the B5071 Jack Mills Way, Checkley Lane, Den Lane, Chorlton Lane, Casey Lane and Newcastle Road. The local road network generally operates well although some localised delays can be experienced particularly at peak times in the built-up area around Crewe.

14.3.8 Relevant accident data for the road network subject to assessment has been obtained from CEC for the latest available three year period (2011 to 2014) and has been assessed and any identified clusters have been examined. Five accident clusters were identified in the Crewe area and these are as follows:

- at the A500 Newcastle Road/Shavington Bypass roundabout junction with the A531 Newcastle Road/A5020 Weston Road, known as the A500 Meremoor Roundabout (10 accidents over three years, with one serious, no fatal casualties and one accident involving either pedestrians or cyclists);
- the A51 Nantwich Bypass/A534 Crewe Road/B5338 Crewe Road junction, known as the A51 Nantwich Road Roundabout (10 accidents over three years, with two serious, no fatal casualties and one accident involving either pedestrians or cyclists);
- the A530 Middlewich Road/Colleys Lane junction (11 accidents over three years, with two serious, no fatal casualties and four accidents involving either pedestrians or cyclists);
- the A532 Earle Street Roundabout (nine accidents over three years, with one serious, no fatal casualties and five accidents involving either pedestrians or cyclists); and
- the A5019 Mill Lane/A5078 Oak Street junction, known as the A5019 Oak Street Roundabout (10 accidents over three years, with one serious, no fatal casualties and five accidents involving either pedestrians or cyclists).

14.3.9 Any significant effects at these locations will be reported in the formal EIA Report.

14.3.10 Bus services travel through the area on their way to the central hub of Crewe. There is one bus corridor that would cross the route of the Proposed Scheme and this follows the A500 Shavington Bypass via Shavington and Weston. The A500 corridor is served by four services, providing connections to Shavington, Weston, Basford, Hough and Nantwich.

14.3.11 National and local rail services are accessible at Crewe station, which is a major rail interchange. At Crewe station, the WCML connects with the Crewe to Derby Line, the Crewe to Manchester Line and the Crewe to North Wales Line. These connections provide access to major destinations, including London, Liverpool, Manchester, Birmingham, Cardiff and Glasgow.

14.3.12 There are pedestrian footways throughout Crewe town centre and in the smaller settlements of Shavington, Weston, Chorlton and Betley. In Crewe, there are off-road cycle routes along Macon Way, the A534 Crewe Road, Weston Road, Nantwich Road and Crewe Green Road. There is also a network of advisory cycle routes in the South Cheshire area, connecting Crewe with some of the smaller surrounding settlements within the area.

14.3.13 There are no navigable waterways or canals situated in the South Cheshire area.

14.4 Effects arising during construction

Avoidance and mitigation measures

14.4.1 The following measures have been included as part of the design of the Proposed Scheme and would avoid or reduce effects on transport users:

- creation of a haul route adjacent to the route of the Proposed Scheme;
- construction materials and equipment would be transported along the haul route where reasonably practicable to reduce HGV movements on the public highway;
- new highways to be constructed and operational prior to the stopping up of any existing highways where reasonably practicable;
- the majority of roads crossing the Proposed Scheme would be maintained or locally diverted during construction to limit the need for diversions of traffic onto alternative routes;
- restricting road closures to overnights and weekends where reasonably practicable;
- HGV routeing, as far as reasonably practicable, along the strategic and/or primary road network;
- temporary alternative routes for PRoW during construction; and
- provision of on-site welfare facilities to reduce daily travel by site workers.

14.4.2 The draft CoCP includes measures that seek to reduce the impacts and effects of deliveries of construction materials and equipment, including where appropriate reducing construction HGV trips during peak background traffic periods. The draft CoCP includes HGV management and control measures.

14.4.3 The number of private car trips to and from the site (both workforce and visitors) would be reduced by encouraging the use of alternative sustainable modes of transport or vehicle sharing where reasonably practicable. This would be supported by an overarching framework travel plan that would require construction workforce travel plans to be produced along with a range of potential measures to mitigate the impacts of traffic and transport movements associated with construction of the Proposed Scheme.

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

14.4.5 Specific measures would include:

- core site operating hours will be 08:00 to 18:00 on weekdays and 08:00 to 13:00 on Saturdays and site staff and workers would, therefore, generally

arrive before the morning peak hour and depart after the evening peak hour; and

- excavated material being reused where suitable and reasonably practicable along the route of the Proposed Scheme.

14.4.6 Where works would affect Network Rail assets, disruption to travelling passengers and freight movements would be minimised as far as reasonably practicable. This includes measures such as:

- programming the construction works to coincide with possessions that are required and planned by Network Rail for the general maintenance of their railway;
- planning the required construction works so that they can be undertaken in short overnight stages so that passenger services are not disrupted; and
- programming longer closures at the weekend and on bank holidays to minimise the number of passengers affected.

Assessment of impacts and effects

Temporary effects

14.4.7 The following section considers the impacts on traffic and transport and the likely consequential effects resulting from construction of the Proposed Scheme. The temporary traffic and transport impacts within this area would include:

- construction vehicle movements to and from the various worksites;
- road closures and associated diversions; and
- alternative routes for PRoW.

14.4.8 The construction assessment has also considered any impacts that arise from construction of the Proposed Scheme in the adjoining Whitmore Heath to Madeley area (CA4).

14.4.9 Construction vehicle movements required to construct the Proposed Scheme would include the delivery of plant and materials, movement of excavated materials and site worker trips. Works would include utilities diversions, earthworks, underpass, viaduct, bridges and highway construction.

14.4.10 There would be 15 construction compounds in this area, including one main civil engineering compound and eight civil engineering satellite compounds, five of which are used for railway systems installations. There would be an additional six satellite compounds for railway systems installations. The South Crewe ATFS main compound would manage works for the civil engineering satellite compounds. Satellite compounds for railway systems works would be managed from the Stone railhead main compound in the Stone and Swynnerton area (CA3).

14.4.11 Details of construction compounds are provided in Section 2.3.

14.4.12 It is expected that the M6, the A51 London Road and the A500 Newcastle Road/Shavington Bypass would provide the primary access routes for construction

vehicles, from which HGVs would access construction compounds via Checkley Lane, the B5071 Wybunbury Road/Bridge Street/Wrinehill Road/Den Lane, the Newcastle Road (part of which is the A531) /Chorlton Lane, Weston Lane and the B5071 Jack Mills Way. Where reasonably practicable, HGVs will use the haul road alongside the route of the Proposed Scheme to reduce the impact on the local road network.

14.4.13 Construction of the Proposed Scheme is expected to result in increases in traffic flows on the following roads as a result of construction traffic, temporary closures and diversions or realignments:

- M6;
- A51 London Road;
- A500 Newcastle Road/Shavington Bypass;
- A531 Newcastle Road;
- B5071 Wybunbury Lane/Bridge Street;
- Newcastle Road;
- Weston Lane;
- Chorlton Lane;
- Wrinehill Road/Den Lane;
- B5071 Jack Mills Way; and
- Crewe Road.

14.4.14 The expected increases in traffic have the potential to result in increased congestion and delays and, on some roads, increased traffic severance for non-motorised users. The assessment of these will be reported in the formal EIA Report.

14.4.15 The construction of the Proposed Scheme would be likely to require temporary traffic management measures in the vicinity of the works. Any lane restrictions would be scheduled to reduce as far as reasonably practicable the impacts on traffic in the peak periods, with advance notice provided to travellers.

14.4.16 The Proposed Scheme would require the permanent stopping up of the B5071 Jack Mills Way where the road crosses the footprint of the HS2 Crewe IMD. The direct impact of this road being stopped up is reported under operational impacts.

14.4.17 The Proposed Scheme would require the permanent stopping up of Checkley cum Wrinehill Footpath 15, Blakenhall Footpath 17, Chorlton Footpath 3 and Shavington cum Gresty Footpath 2. The direct impacts of these PRoW being stopped up are reported under operational impacts.

14.4.18 There would be temporary alternative routes for a number of PRoW in the vicinity of the Proposed Scheme. The following PRoW would all be temporarily diverted:

- Checkley cum Wrinehill Footpath 8;
- Checkley cum Wrinehill Footpath 5;

- Checkley cum Wrinehill Footpath 4;
- Blakenhall Footpath 13;
- Blakenhall Bridleway 8;
- Blakenhall Footpath 9;
- Blakenhall Footpath 7;
- Blakenhall Bridleway 12;
- Blakenhall Footpath 11;
- Chorlton Footpath 13;
- Chorlton Footpath 7;
- Chorlton Footpath 8;
- Basford Footpath 6;
- Basford Footpath 3;
- Basford Footpath 4;
- Basford Footpath 5;
- Basford Footpath 10;
- Basford Footpath 1; and
- Basford Footpath 11.

14.4.19 Non-motorised users would also be re-routed around construction compounds. The changes to PRoW are likely to result in some increases in travel distances with the potential for adverse significant effects. These will be reported in the formal EIA report.

Other mitigation measures

14.4.20 The implementation of the CoCP in combination with the construction workforce travel plan would, to some degree, mitigate the transport related effects during construction of the Proposed Scheme. In order to provide a robust assessment, the reductions in effects arising from the travel plan measures have not been included in the assessment, which will mean the adverse effects may be over-stated.

14.4.21 Any further traffic and transport mitigation measures required during the construction of the Proposed Scheme would be considered as necessary based on the outcomes of the assessment. These will be reported in the formal EIA Report.

Summary of likely residual significant effects

14.4.22 Construction of the Proposed Scheme has the potential to lead to additional congestion and/or increase delays for road users on a number of routes namely the M6, the A51 London Road, the A500 Newcastle Road/Shavington Bypass, the A531 Newcastle Road, the B5071 Wynbury Lane/Bridge Street, Newcastle Road, Weston

Lane, Chorlton Lane, Wrinehill Road/Den Lane, the B5071 Jack Mills Way and Crewe Road. The increases in traffic could also result in increased traffic severance for non-motorised users of the routes. These will be reported in the formal EIA Report.

14.4.23 Nineteen PRoW would be affected and users would be diverted at different times during the construction period. This could result in significant adverse effects on users. This will be reported in the formal EIA Report.

14.5 Effects arising from operation

Avoidance and mitigation measures

14.5.1 The following measures have been included as part of the design of the Proposed Scheme and will avoid or reduce impacts on transport users:

- reinstatement of most roads on or close to their original alignments; and
- replacement, diversion or realignment of PRoW.

Assessment of impacts and effects

14.5.2 The following section considers the impacts on traffic and transport and the consequential effects resulting from the operational phase of the Proposed Scheme.

14.5.3 The operation of the Proposed Scheme is unlikely to have any substantial impacts within this area. Whilst it is proposed to locate the HS2 Crewe IMD in this area, the majority of traffic associated with the depot is likely to be outside of the road network peak periods and therefore unlikely to result in any significant delay or congestion.

14.5.4 Although some HS2 services would stop at Crewe, the Proposed Scheme is unlikely to have a significant effect on users of Crewe Station. The increase in users at Crewe Station may have an impact on delays and congestion on the roads in the vicinity of the station. However, this is not expected to be substantial.

14.5.5 The other operational impacts are related to permanent diversion, realignment and stopping up of roads and the diversion of PRoW.

14.5.6 The B5071 Jack Mills Way crosses the footprint of the HS2 Crewe IMD and it is proposed that it is permanently stopped up. The stopping up of part of this road is likely to lead to an increase in traffic on the parallel Crewe Road. The change in journey distance is unlikely to be significant for vehicular traffic. However, the closure may have an impact on delays and congestion on roads in the vicinity of the B5071 Jack Mills Way and alternative routes into Crewe. These effects will be reported in the formal EIA Report.

14.5.7 The closure of the B5071 Jack Mills Way may result in a significant effect due to the diversion distance for non-motorised users of the route. These effects will be reported in the formal EIA Report.

14.5.8 In parallel to considering a potential alternative location for the permanent maintenance facilities, HS2 Ltd will continue to work with CEC to maintain the improvements provided by the B5071 Jack Mills Way, which could include either realigning the B5071 Jack Mills Way or reconfiguring the proposed HS2 Crewe IMD

such that the existing road is retained. Changes to the design will be reported in the formal EIA Report.

14.5.9 It is proposed to permanently realign or divert Checkley Lane, Den Lane, Chorlton Lane, Newcastle Road, Casey Lane, Weston Lane, the A500 Shavington Bypass, the Crewe Road and Crotia Mill Lane. The Chorlton Lane diversion would result in an increase in travel distance of up to 4km for users from East Chorlton travelling to the south of the Proposed Scheme and, although the number of users of this route is expected to be low, the increase in journey distance could be substantial and may also have a significant impact on non-motorised users of this route. The realignments and diversions of Checkley Lane, Den Lane, Newcastle Road, Casey Lane, Weston Lane, the A500 Shavington Bypass, the B5071 Jack Mills Way/Gresty Road, Crewe Road parallel to the existing Jack Mills Way and Crotia Mill Lane are not expected to substantially change journey time or result in any significant effects for vehicles, but may have an impact on non-motorised users of these routes. These will be reported in the formal EIA report.

14.5.10 The Proposed Scheme will require the permanent stopping-up of a number of PRoW. Blakenhall Footpath 15 and Blakenhall Footpath 17 would be permanently stopped-up between the WCML and Blakenhall Footpath 4, with non-motorised users diverted and an alternative route available via Blakenhall Footpath 9 and the Checkley Lane realignment.

14.5.11 Chorlton Footpath 3 would be permanently stopped-up from Waybutt Lane to Hough Footpath 11 and non-motorised users would be diverted along Waybutt Lane to Blakenhall Bridleway 2 before crossing the Proposed Scheme (HS2 main line, HS2 spur and WCML realignment) over Blakenhall Bridleway 12 East accommodation overbridge, under the Blakenhall Bridleway 12 Central accommodation underbridge and over the Blakenhall Bridleway 12 West accommodation overbridge and rejoining the Blakenhall Footpath 11 along the access road to the balancing ponds and the Blakenhall Footpath 11 diversion.

14.5.12 Shavington cum Gresty Footpath 2 would be permanently stopped-up as it crosses the proposed HS2 Crewe IMD with non-motorised users diverted to the Crewe Road realignment.

14.5.13 The permanent stopping-up of these PRoW is likely to result in a substantial increase in travel distance for non-motorised users of these routes and may result in significant effects for users. These will be reported in the formal EIA report.

14.5.14 A number of PRoW would either be permanently realigned or diverted including:

- Checkley cum Wrinehill Footpath 8 would be realigned, firstly in a southbound direction and parallel to the Proposed Scheme along the Checkley cum Wrinehill Footpath 8 diversion and then crossing the Proposed Scheme under the Checkley Brook viaduct before rejoining the Checkley cum Wrinehill Footpath 8 via the Checkley cum Wrinehill Footpath 4 realignment;
- Checkley cum Wrinehill Footpath 5 would be realigned along the Checkley cum Wrinehill Footpath 5 realignment before rejoining Checkley Road;

- Checkley cum Wrinehill Footpath 4 would be locally realigned just to the south of the Proposed Scheme so as to avoid a balancing pond and associated access road;
- Blakenhall Footpath 13 would be locally realigned along the Blakenhall Footpath 13 realignment to the Den Lane (East) realignment;
- Blakenhall Footpath 9 would be realigned along the Blakenhall Footpath 9 realignment to the Den Lane (East) realignment before crossing the Proposed Scheme (HS2 main line and HS2 spurs) on Den Lane under the Den Lane (West) and Den Lane (East) viaducts;
- Blakenhall Footpath 7 would be diverted along the Blakenhall Footpath 7 diversion and the Blakenhall Bridleway 12 realignment before crossing the Proposed Scheme (HS2 main line, HS2 spurs and WCML realignment) over Blakenhall Bridleway 12 East accommodation overbridge, under the Blakenhall Bridleway 12 Central accommodation underbridge and over the Blakenhall Bridleway 12 West accommodation overbridge to the existing alignment of Blakenhall Bridleway 12;
- Blakenhall Bridleway 12 would be realigned along the Blakenhall Bridleway 12 realignment crossing the Proposed Scheme (HS2 main line, HS2 spur southbound and WCML realignment) at the Blakenhall Bridleway 12 Accommodation overbridge;
- Blakenhall Footpath 11 would be realigned along the Blakenhall Bridleway 12 realignment and rejoin Blakenhall Footpath 11 along the access road to the balancing ponds and the Blakenhall Footpath 11 diversion;
- Chorlton Footpath 13 would be diverted along the Chorlton Footpath 13 diversion to Chorlton Footpath 9;
- Chorlton Footpath 7 would be locally realigned to cross the Proposed Scheme (HS2 main line, HS2 IMD access spurs and HS2 spurs) over the Chorlton Footpath 7 overbridge before rejoining its existing alignment;
- Chorlton Footpath 8 would be locally realigned in the vicinity of Heath Farm following the alignment of the diverted highway Chorlton Lane;
- Basford Footpath 6 would be locally realigned as a result of the Newcastle Road realignment;
- Basford Footpath 17 would be stopped-up with non-motorised users crossing the Proposed Scheme (HS2 main line, HS2 IMD access spurs and HS2 spurs) on the Newcastle Road realignment;
- Basford Footpath 5, which connects Newcastle Road to Casey Lane, would be diverted to the Basford Footpath 5 diversion and connect Casey Lane to the Newcastle Road realignment;
- Basford Footpath 4 would be locally realigned as it crosses the Newcastle Road realignment and also to accommodate a balancing pond;

- Basford Footpath 3 would be locally realigned as it crosses the Casey Lane realignment;
- Basford Footpath 10 would be locally realigned along the Basford Footpath 10 realignment as it crosses the Weston Lane realignment;
- Basford Footpath 1 would be realigned along the Basford Footpath 1 realignment due to the A500 Shavington Bypass realignment; and
- Basford Footpath 11 would be realigned along the Basford Footpath 11 realignment due to the A500 Shavington Bypass realignment. Basford Footpath 11 would also be realigned as it crosses the HS2 Crewe IMD footprint along the perimeter of the IMD site on the Basford Footpath 11 realignment to the retained section of the B5071 Jack Mills Way.

14.5.15 Users of Checkley cum Wrinehill Footpath 8 and Blakenhall Footpath 7 would have an increase in travel distance of over 500m.

14.5.16 The realignment of some of the PRoW would increase journey distance and time for non-motorised users and may result in significant effects. These will be reported in the formal EIA Report.

Other mitigation measures

14.5.17 Any further traffic and transport mitigation measures required during the operation of the Proposed Scheme will be considered as necessary based on the outcomes of the assessment. These will be reported in the formal EIA Report.

Summary of likely residual significant effects

14.5.18 The Proposed Scheme would require the permanent stopping up of the B5071 Jack Mills Way and this would result in increased journey times for users and may impact significantly on non-motorised users of these routes. In parallel to considering a potential alternative location for the permanent maintenance facilities, HS2 Ltd will continue to work with CEC to maintain the improvements provided by the B5071 Jack Mills Way. Any residual effects will be reported in the formal EIA Report.

14.5.19 A number of other roads would be permanently diverted or realigned although this is not expected to change journey times substantially with the exception of Chorlton Lane where the diversion could result in a substantial increase in travel distance for motorised and non-motorised users although the number of users of this route is expected to be low. These effects will be reported in the formal EIA Report.

14.5.20 Four PRoW would be permanently stopped-up and this may impact significantly on non-motorised users of these routes. These will be reported in the formal EIA Report.

14.5.21 Nineteen PRoW would be permanently realigned or diverted. There could be an increase of over 500m in distance for some users on two of these routes. Any significant effects will be reported in the formal EIA Report.

15 Water resources and flood risk assessment

15.1 Introduction

15.1.1 This section provides a description of the current baseline for water resources and flood risk in the South Cheshire area. The likely impacts and significant effects of the Proposed Scheme's construction and operation on surface and groundwater bodies and their associated water resources are assessed. The likely impacts and significant effects of the Proposed Scheme on flood risk and land drainage are also considered.

15.1.2 Engagement has been undertaken with the Environment Agency, CEC (who are the Lead Local Flood Authority (LLFA)) and United Utilities Limited (who are the local water and sewerage undertaker). The purpose of this engagement has been to obtain relevant baseline information and discuss the Proposed Scheme and potential effects. Engagement with these stakeholders will continue as part of the development of the Proposed Scheme.

15.1.3 Maps showing the location of environmental features and the construction and operational components of the Proposed Scheme can be found in the Volume 2, CA5 Map Book.

15.2 Scope, assumptions and limitations

15.2.1 The scope, assumptions and limitations for the water resources and flood risk assessment are set out in the draft SMR and Volume 1.

15.2.2 Unless indicated otherwise, the spatial scope of the assessment is based upon the identification of surface water and groundwater features in the South Cheshire area that are within 1km of the centre line of the proposed route, including the proposed WCML modifications. This is the definition of the study area.

15.2.3 The assessment of surface waters focuses on the Wistaston Brook and River Trent catchments. In the South Cheshire area this includes the River Lea, Checkley Brook and Gresty Brook.

15.2.4 The groundwater assessment focuses on the superficial glaciofluvial deposits Secondary A aquifer, which is found in the southern and central area of the South Cheshire area, and the underlying Sidmouth Mudstone Formation, a Secondary B aquifer of the Mercia Mudstone Group, which is found in the south and north of the area. The alluvium and river terrace deposits, both Secondary A aquifers, are also assessed.

15.2.5 Impacts on biological receptors, such as aquatic fauna and flora are assessed in Section 8, Ecology and biodiversity.

15.2.6 The assessment is primarily based on desk study information due to land access limitations. However, surveys of accessible water features within the study area are currently in progress. Hydraulic modelling of rivers and watercourses is also currently being undertaken. The assessment will be updated in the formal EIA to reflect the findings of these surveys and modelling studies.

15.3 Environmental baseline

15.3.1 The Proposed Scheme would pass over the floodplains of the River Lea and Checkley Brook on a viaduct. It would then be constructed in sections of cutting or on embankment, with some short sections at existing ground level. The Proposed Scheme would also include northbound and southbound spurs connecting into the WCML, a new section of WCML (to allow the transition from high speed to conventional rail) and a connection into the HS2 Crewe IMD.

Water resources and Water Framework Directive (WFD) baseline

15.3.2 The water bodies in the study area fall within the Staffordshire Trent Valley Catchment of the Humber River Basin District (RBD) and Wistaston Brook catchment of the North West RBD.

15.3.3 River Basin Management Plans (RBMP)[95] identify the chemical[96] and ecological[97] condition of all surface water bodies, and the quantitative[98] and chemical[99] status of all groundwater bodies within these RBDs.

15.3.4 The statutory objective of each RBMP is to prevent deterioration of all water bodies at good or high status and to prevent water bodies at less than good status from deteriorating further. Pending the results of detailed site surveys, all surface water bodies, other than minor ponds and ditches, have been identified within this draft assessment as being of either high or very high value, sensitive to impacts that could affect any one of the individual elements that are used to define their WFD status in the long term.

15.3.5 A summary of the crossing locations, current overall WFD status and future overall status objectives associated with the key surface water bodies within the South Cheshire area is provided in Table 11.

Table 11: Key surface water bodies and their WFD status

Water body name and identification number[100]	Crossing location description	Current WFD Status	WFD status objective
Checkley Brook - Upper GB112068055230	Checkley Brook viaduct	Bad	Good by 2027
Lea GB112068055200	Checkley Brook viaduct	Good	Good

[95] Environment Agency (2015), Water for life and livelihoods Part 1: North West river basin district: River basin management plan.
[96] The chemical status of surface waters reflects concentrations of priority and hazardous substances present.
[97] The ecological status of surface waters is determined based on the following elements:
Biological elements - communities of plants and animals (for example, fish and rooted plants), assessed in the ecology and biodiversity section;
Physico-chemical elements – reflects concentrations of pollutants such as metal or organic compounds, such as copper or zinc;
Hydromorphological elements – reflects water flow, sediment composition and movement, continuity (in rivers) and the structure of physical habitats.
[98] The quantitative status of groundwaters reflects the presence or absence of saline or other intrusions, interactions with surface water, issues related to groundwater dependent terrestrial ecosystems (GWDTE) and overall water balance.
[99] The chemical status of a groundwater body reflects effects on drinking water protected areas (DWPA), its general quality, the importance of water quality within the water body for GWDTEs and surface water interactions and whether there are intrusions of poor quality groundwater present.
[100] The Environment Agency has attributed each surface water and groundwater body a unique water body identification (ID) number.

Water body name and identification number[100]	Crossing location description	Current WFD Status	WFD status objective
Wistaston Brook GB112068055280	Tributary watercourse crossings - WCML Den Lane culvert - Blakenhall South inverted siphon - Blakenhall Spur culvert - Blakenhall drop inlet culvert - WCML Betley South culvert - WCML Betley North culvert - Gonsley drop inlet culvert - Half Moon inverted siphon - Basford West culvert	Bad	Good by 2027

15.3.6 There are two licenced surface water abstractions in the study area, both of which are from unnamed watercourses. These are located at Weston Hall Estate, to the east of the Proposed Scheme, and at Checkley Brook Farm.

15.3.7 Records of private unlicensed water abstractions, which comprise those for quantities less than 20m^3 per day, have been obtained from the local authority. From this data it can be confirmed that there are no private unlicensed surface water abstractions registered within the study area. Unregistered surface water supplies may be present that would also need to be protected.

15.3.8 The geology of the area is described in detail in Section 10, Land quality, and is summarised below.

15.3.9 The main bedrock geology within the study area consists of the Mercia Mudstone Group, which is classified as a Secondary B aquifer. In the South Cheshire area the Mercia Mudstone consists of the Sidmouth Mudstone Formation, in the south and the north, and the Northwich Halite and Wilkesley Halite Members, which are both classified as Unproductive aquifers, in the south and central areas respectively.

15.3.10 Secondary B aquifers of the Mercia Mudstone Group are predominantly impermeable with minor and localised permeable beds, such as sandstone skerrie bands. Skerries can yield limited quantities of groundwater suitable for domestic or small scale agricultural use.

15.3.11 Superficial deposits consisting of till, glaciofluvial deposits, alluvium and river terrace deposits, cover the whole South Cheshire area. These include the Weaver and Dane Quaternary Sand and Gravel Aquifers, which comprise a designated WFD water body. Till, which is classified as unproductive, is typically 30m – 40m thick where it is crossed by the Proposed Scheme. Glaciofluvial deposits, which overlie the till in the southern and central area, are classified as Secondary A aquifers as are the alluvial and river terrace deposits, which are found along the main surface watercourses. Secondary A aquifers may be capable of supporting water supplies at a local rather than strategic scale and can form an important source of baseflow to rivers. Small isolated pockets

of peat, which are found either side of the Proposed Scheme are classified as unproductive.

15.3.12 A summary of the groundwater body locations, current overall WFD status and future overall status objectives associated with the designated groundwater bodies within the South Cheshire area is provided in Table 12.

Table 12: Groundwater body and its WFD status

Water body name and identification number	Location	Current WFD status	WFD status objective
Weaver and Dane Quaternary Sand and Gravel Aquifers GB41202G991700	Full coverage of the South Cheshire area	Poor	Good by 2027

15.3.13 There are two licensed groundwater abstractions in the study area, located at Grange Farm. The abstractions are from the superficial deposits and the water from both abstractions is used for agriculture and domestic supply.

15.3.14 There are no groundwater Source Protection Zones in the South Cheshire area.

15.3.15 The information on private unlicensed water abstractions obtained from the local authority indicates that there are no unlicensed groundwater abstractions located within the study area. Unregistered surface water supplies may be present that would also need to be protected.

15.3.16 There are 11 features within the study area, identified from Ordnance Survey Maps that have potential to be springs, all of which are likely to contribute flows to surface water bodies. In the absence of site surveys all of these features are assumed to comprise springs, which are high value receptors.

15.3.17 There are no designated groundwater dependent terrestrial ecosystems (GWDTE) within the study area. Betley Mere SSSI is described in Section 8, Ecology and biodiversity and although it is not designated as a GWDTE in the RBMP this SSSI is likely to have some dependence on groundwater.

Flood risk and land drainage baseline

15.3.18 The Environment Agency's Flood Map is the principal dataset that has been used to define the baseline for river, surface water and infrastructure failure flood risks. River and surface water flood risk zones are shown in WR-01 Map Series in Volume 2, CA5 Map Book.

15.3.19 The LLFA for the South Cheshire area is CEC. The following reports were used to help determine the baseline flood risk within the study area:

- Cheshire East Council Preliminary Flood Risk Assessment (PFRA), 2007[101]; and

[101] http://www.cheshireeast.gov.uk/planning/spatial_planning/research_and_evidence/strategic_flood_risk_assmnt/strategic_flood_risk_assmnt.aspx

- Crewe and Nantwich Borough Council Strategic Flood Risk Assessment[102] (SFRA), 2008.

15.3.20 The principal sources of flood risk are rivers and surface water. The area includes substantial areas of floodplain associated with the Lower River Lea and Checkley Brook to the west of Wrinehill Mill, the Mere Gutter, Swill Brook, Basford Brook and Gresty Brook.

15.3.21 Existing topography, soils and land drainage systems within the area are described in Section 4, Agriculture, forestry and soils. The rivers and watercourses within the South Cheshire area are connected to an extensive network of existing open drains. Subsurface drainage systems are also likely to be present in fields used for agriculture. The land drainage function of these systems, which is important for crop productivity, is potentially sensitive to increases in water levels within the receiving watercourses.

15.4 Effects arising during construction

Avoidance and mitigation measures

15.4.1 The draft CoCP includes a range of mitigation measures that are suitable to reduce impacts to as low a level as is reasonably practicable. The measures that are of particular relevance to water resources and flood risk during construction are described below.

Water resources and WFD

15.4.2 The principal strategy adopted to limit the temporary and permanent effects of the Proposed Scheme on water bodies and their associated water resources, is to avoid sensitive receptors wherever reasonably practicable, recognising the wider constraints on route selection. This strategy has reduced the risks associated with the Proposed Scheme not complying with the requirements of the WFD. Examples of this avoidance strategy include:

- avoidance of floodplain areas: the route of the Proposed Scheme would avoid passing along river or stream valleys, such as that of the River Lea and Checkley Brook, and their associated floodplains. Instead it would pass over the watercourses on viaducts spanning the floodplain. The only permanent structures within river floodplain areas would be where the viaducts require intermediate piers, and these would be placed so as to avoid the river channel;
- avoidance, where reasonably practicable, of GWDTEs, including natural springs that can play a key role in the hydrology and hydrogeology of such ecosystems; and
- avoidance, where reasonably practicable, of major public water supplies and smaller licensed and unlicensed abstractions of surface and groundwater.

15.4.3 Where permanent watercourse diversions and/or realignments are proposed, the aim will be to design these with equivalent hydraulic capacity to the existing channels. The design of the Proposed Scheme will also aim to ensure that field subsurface drainage

[102] http://www.cheshireeast.gov.uk/planning/spatial_planning/research_and_evidence/strategic_flood_risk_assmnt/crewe_and_nantwich_sfra.aspx

systems can be adapted to discharge into the new channel. Where such watercourses are natural channels, the design will aim to incorporate appropriate features to retain, and where reasonably practicable, enhance their hydromorphological status. For watercourses that are not in their natural condition, the design will aim, where reasonably practicable, to incorporate measures to improve their hydromorphological status, provided this is compatible with the watercourses' flood risk and land drainage functions.

15.4.4 To protect water bodies and their associated water resources from the potential impacts of polluting materials within construction site runoff, the practices detailed in the relevant pollution prevention guidelines and Construction Industry Research and Information Association (CIRIA) publications would be adhered to in so far as is reasonably practicable. The draft CoCP also requires contractors to comply, as far as reasonably practicable, with BS 6031 code of practice for earthworks regarding the general control of site drainage including, for example, all washings, dewatering, abstractions and surface water runoff, unless otherwise agreed with the Environment Agency. Specific measures referred to in the draft CoCP to protect the water environment include:

- provision of maps showing sensitive areas and buffer zones where no pollutants are to be stored or used;
- preparation of method statements for: silt management, site drainage at main compounds and satellite compounds, the storage and control of oils and chemicals and the prevention of accidental spillages, in consultation with the Environment Agency, LLFA and other relevant regulators as part of the approvals process. These method statements would cover, where applicable:
  - the avoidance of discharges of site runoff to ditches, watercourses, drains, sewers or soakaways without the prior agreement of the appropriate authority;
  - measures to prevent silt-laden runoff and other pollutants entering the water environment; and
- restrictions or controls on excavation within watercourses to limit effects on water quality, sedimentation, fisheries and aquatic ecology.

15.4.5 Where watercourses would be permanently culverted under the route of the Proposed Scheme or beneath proposed highway realignments, or to allow maintenance access to features such as balancing ponds, temporary channel realignments may be required to allow new culverts to be constructed in dry conditions. Where such realignments are required these would be established in advance of stopping up the existing channel. The relevant watercourse crossings include:

- crossings by the Proposed Scheme of the Checkley Brook and River Lea (Checkley Brook viaduct);
- crossings by the Proposed Scheme of the tributaries of the Wistaston Brook at Blakenhall South inverted siphon, the Blakenhall drop inlet culvert and Blakenhall Spur culvert; and

- crossings by the Proposed Scheme of the tributaries of Gresty Brook at the Basford West culvert, Gonsley drop inlet culvert.

15.4.6 Existing groundwater abstraction boreholes or abstraction points would be protected from physical damage, in so far as reasonably practicable. If boreholes are to be decommissioned and replaced with alternatives, contractors would adopt the latest good practices, as far as reasonably practicable. This would also be applicable to springs potentially affected by construction, although additional measures may be required to mitigate temporary construction impacts on springs that are to be re-located.

15.4.7 Measures would be introduced to mitigate the temporary and permanent effects on groundwater flows and water quality during excavation and construction of foundations and cuttings as far as is reasonably practicable. The types of measure likely to be adopted could include:

- installing cut-off structures around excavations;
- ensuring cut-off structures are driven to sufficient depths to meet an underlying strata or zone of lower permeability;
- promoting groundwater recharge, such as discharging abstracted water to recharge trenches around excavations to maintain baseline groundwater and surface water conditions; and
- incorporating passive bypasses within the design, which could comprise a 'blanket' of permeable material, such as gravel, placed around temporary structures allowing groundwater to bypass the below-ground works, without a rise in groundwater levels on the upstream side.

15.4.8 In accordance with the draft CoCP, monitoring would be undertaken in consultation with the Environment Agency prior to, during and post construction, if required, to establish baseline conditions for surface water and groundwater and to confirm the effectiveness of agreed construction impact mitigation measures.

Flood risk and land drainage

15.4.9 The contractors would, as far as reasonably practicable, ensure that flood risk is managed throughout the construction period and would consider flooding issues when planning sites and storing materials. If necessary, temporary provision would be made to manage impacts on existing land drainage systems during construction. Some of the specific measures referred to in the draft CoCP, include:

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

- design of temporary watercourse realignments with equivalent hydraulic capacity to the existing channels, ensuring that field subsurface drainage systems can be adapted to discharge into the new channel; and
- having regard to the requirement for construction activities to avoid any significant increases in flood risk.

15.4.10 In accordance with the draft CoCP, monitoring would also be undertaken in consultation with the Environment Agency and, where applicable, the LLFA, to ensure that temporary structures are installed, maintained and removed in accordance with the relevant environmental permits and that impacts on existing land drainage systems are limited as far as is reasonably practicable.

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

- the floodplain avoidance strategy outlined above would ensure that impacts on flood flows within rivers and streams, and their floodplains, would be limited to those associated with the intermediate pier structures;
- the design will make precautionary allowances for replacement flood storage areas to mitigate for the impact of intermediate piers situated in floodplain areas. This is in case detailed hydraulic modelling indicates that the effects of these losses of floodplain would be significant in terms of the magnitude of any increase in peak flow downstream or increase in water level upstream, and the sensitivity of any receptors potentially affected;
- on watercourses where new culverts are to be installed beneath the route of the Proposed Scheme, the culvert length would be reduced as far as is reasonably practicable, and would be designed with invert levels below the firm bed of the watercourse to mitigate impact on flows and sediment transfer. Culverts would be designed in general accordance with CIRIA and Environment Agency guidance, and in consultation with the Environment Agency. The mitigation specifically proposed for the ecology of the watercourses is considered in Section 8, Ecology and biodiversity;
- provision has been made to pass surface water runoff and land drainage flows beneath sections of raised embankment that cross dry valleys. This would be achieved using perimeter drains and culverts, with their inverts set below the likely level of any upstream field subsurface drainage systems;
- in locations where the route of the Proposed Scheme would cross watercourses, the design aim would be for structures to accommodate flood flows up to and including the 1 in 100 (1%) annual probability storm with an allowance for climate change based on latest guidance issued by the Environment Agency[103];
- runoff from the footprint of the new infrastructure may occur more rapidly post-construction due to steeper slope angles and the permeability of the

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

newly-created surfaces. The design of drainage systems would aim to ensure that there are no significant increases in flood risk downstream, during storms up to and including the 1 in 100 (1%) annual probability design event, with an allowance for climate change based on the latest guidance issued by the Environment Agency;

- balancing ponds for railway drainage have been sized on a precautionary basis, pending more detailed information about the permeability and runoff characteristics of existing and proposed ground surfaces;
- where reasonably practicable, drainage would be designed to encourage water to soak back into the ground, for example where cuttings intercept groundwater flows;
- at cutting locations, drainage measures would be provided with the aim of preventing flow into the cutting and diverting this water into its natural catchment. Where reasonably practicable, runoff from the cuttings would also be drained to the catchments to which this water would naturally drain, avoiding transfers of water from one water body to another, which could increase flood risk or impact on land drainage systems; and
- measures would be introduced to reduce any potentially significant effects on groundwater flood risk as far as is reasonably practicable including the incorporation of passive hydraulic bypasses at cuttings and other below ground structures. These could for example comprise a 'blanket' of permeable material such as gravel.

Assessment of impacts and effects

15.4.12 The majority of the potential temporary effects on the water environment during construction would be mitigated by the working methods outlined in the draft CoCP. Permanent effects would be mitigated by a range of measures incorporated into the design that have been informed by the environmental assessment process.

Water resources and WFD

15.4.13 Potential impacts on surface water quality, due to site runoff and increased pollution risk, are a key concern during construction and have potential to affect abstractions and the water environment more generally. However, the practices outlined in the draft CoCP are considered adequate to mitigate any associated effects on water quality, such that no significant effects are anticipated.

15.4.14 The proposed cuttings in the study area intersect the glaciofluvial deposits Secondary A aquifer and the till. Whilst there may be minor localised impacts, the implementation of the draft CoCP and standard mitigation measures would mean that any temporary and permanent effects are unlikely to be significant. The implications of localised impacts on these aquifers for features, such as springs and abstractions, are assessed below.

15.4.15 Construction activities associated with the cuttings near Checkley Lane in the southern part of the study area could impact on the quality or quantity of water at the two licensed groundwater abstractions at Grange Farm. Even with the draft CoCP

measures taken into account, the magnitude of the potential impact on these high value receptors could be major during construction. Although the abstractions are over 300m from the Proposed Scheme, without further information about groundwater levels in the area, they are conservatively assumed to have potential to be permanently impacted. This constitutes a major adverse effect.

15.4.16 A potential spring feature to the west of Chorlton, which is directly beneath the route of the Proposed Scheme, would be permanently lost. Construction of the HS2 IMD reception tracks would result in the permanent loss of a similar feature to the east of Manor Farm. These features are currently assessed as high value receptors, pending the results of a site survey. The impact on the potential spring features west of Chorlton would result in a temporary and permanent major adverse effect. Flow from the spring to the east of Manor Farm will be diverted by the Gonsley drop inlet culvert, with a minor magnitude impact, resulting in a temporary and permanent moderate adverse effect.

15.4.17 The construction of cuttings associated with the HS2 main line, HS2 spur (northbound) and Den Lane realignment may result in the deterioration of two potential spring features to the west of the route and south of Yew Tree Farm and Ash Tree Farm, if the groundwater table is lowered or water quality is impacted. As these features are over 600m from the Proposed Scheme, and mitigation measures in the draft CoCP would be employed, the assessment identifies these as potentially moderate adverse effects throughout construction. Potential effects on a spring feature to the west of Swill Brook, approximately 500m to the west of the Proposed Scheme have also been assessed as a moderate adverse effect, due to the potential construction impacts of the HS2 Crewe IMD and HS2 main line cuttings. Pending the results of a site survey, the potential permanent effects on these potential spring features have also been assessed as moderate adverse.

15.4.18 A potential spring feature located near Swill Brook, in proximity to the proposed Blakenhall Retaining Wall 3, and a spring near Basford House located in proximity to the Newcastle Road closure, could both potentially be impacted by the construction of nearby cuttings and associated works, if the local groundwater table is lowered or water quality is impacted. Pending the results of a site survey the assessment, therefore, identifies these as temporary major adverse effects throughout construction. In the absence of further information regarding local water levels, permanent effects to the spring feature near Swill Brook have been conservatively assessed as a moderate adverse effect and potential permanent effects to the spring near Basford House have been conservatively assessed as a major adverse effect. The estimated significances of the permanent effects to these springs are based on the potential for local groundwater levels to be lowered resulting in a diminished water supply to the springs. Significant permanent water quality impacts to the springs would not be expected.

15.4.19 In proximity to Betley Mere SSSI, the WCML mainly overlies glaciofluvial deposits, which extend to the SSSI. The WCML modifications in this area are not expected to be intrusive, and as the ground level at the WCML in this area is around 20m above the ground level at Betley Mere, the construction works are not expected to impact groundwater level or flow to the SSSI. With measures defined in the draft CoCP in place, the construction effects on groundwater quality are also not expected to be

significant. The cuttings of the HS2 main line and HS2 spurs further to the west of the WCML would overlie low permeability till, which is not continuous beneath Betley Mere, therefore, there would be negligible impacts on the groundwater supply to Betley Mere from construction of these elements. Permanent impacts from the Proposed Scheme on groundwater supply to Betley Mere SSSI are also expected to be negligible.

15.4.20 The temporary impact on water resources associated with construction of the viaduct (over the Checkley Brook and River Lea), culverts (Randilow South drop inlet culvert, Randilow North drop inlet culvert, WCML Den Lane culvert, Blakenhall Spur culvert, Blakenhall drop inlet culvert, WCML Betley South culvert, WCML Betley North culvert, Gonsley drop inlet culvert, and Basford West culverto and inverted siphon crossings (Blakenhall South and Half Moon), including any associated temporary channel realignments required, would be mitigated by the application of the measures outlined in the draft CoCP. These measures would also likely ensure that there would be no permanent significant effects on the WFD physico-chemical quality elements of these watercourses.

15.4.21 Blakenhall drop inlet culvert, Gonsley drop inlet culvert and the inverted siphons at Blakenhall South and Half Moon are required to maintain the flow in permanent watercourses beneath the Proposed Scheme. These watercourses have been attributed a high value, pending the results of site survey. The Blakenhall drop inlet culvert, Gonsley drop inlet culvert and Blakenhall South inverted siphon are assessed as having potential to result in moderate adverse effects related to the hydromorphology of these watercourses at this stage.

15.4.22 Half Moon inverted siphon is likely to have a moderate magnitude impact on the hydromorphology of a tributary of Wistaston (Gresty) Brook, which has been attributed a high value pending the results of site survey, this is, therefore, assessed as having potential to result in a permanent major adverse effect at this stage.

15.4.23 Randilow South drop inlet culvert, Randilow North drop inlet culvert and the Blakenhall South inverted siphon are required to maintain connectivity of existing overland flow routes and land drainage systems. There are no existing channel features at these locations, so these structures have no implications for hydromorphology and would not result in significant effects.

15.4.24 The modifications to the WCML would result in the need for the existing watercourse crossings at the WCML Den Lane culvert, WCML Betley South culvert and WCML Betley North culvert to be extended. The extension of these structures is assessed as having a minor magnitude impact on the hydromorphology of these watercourses, as these watercourses would be culverted for more than a few metres. The watercourses concerned have been attributed a high value, pending the results of site survey, and as such the extension of the WCML Den Lane culvert, WCML Betley South culvert and WCML Betley North culverts are assessed as having potential to result in a moderate adverse effect on the hydromorphology of these watercourses at this stage.

15.4.25 The proposed new balancing pond to attenuate surface water runoff from the HS2 Crewe IMD would outfall to Gresty Brook via a new permanent culvert (Basford West culvert). The construction of this culvert, which is approximately 500m long, is likely to restrict the potential for the original watercourse in this area to achieve its WFD target

status by 2027. As such, this culvert is assessed as have potential to result in a permanent moderate adverse effect.

Flood risk and land drainage

15.4.26 Construction of the viaduct over Checkley Brook and the River Lea, and their associated floodplains, would require temporary working within flood zones. Construction sequencing and temporary works design would need to be carefully considered and assessed in terms of impacts on flood risk. Measures defined in the draft CoCP would result in the flood risk and land drainage effects of construction being reduced as far as is reasonably practicable. These activities would be implemented in consultation with the Environment Agency, and where applicable, the LLFA. It is not anticipated that these activities would result in significant temporary adverse effects on flood risk and land drainage.

15.4.27 Construction works associated with culvert and inverted siphon crossings, including any temporary realignment, would also be likely to have a negligible impact on flood risk and land drainage systems. These temporary works would be subject to a consenting process developed in consultation with the Environment Agency and/or with the LLFA and all operations would be in line with the draft CoCP.

15.4.28 The permanent watercourse crossing point at the River Lea/Checkley Brook would be on a viaduct that spans the floodplain. The design incorporates areas where provision can be made to compensate for the loss of floodplain storage associated with the footprint of any intermediate piers. Piers would be placed to avoid the channel and allow access for channel inspection and maintenance, where necessary. As a result it is unlikely that the proposed viaduct would result in significant permanent adverse effects related to flood risks at this site.

15.4.29 The design aim for all permanent culverts would be to accommodate the peak 1 in 100 (1%) annual probability flow in the relevant watercourses, with an explicit allowance for future increases caused by climate change in accordance with current Environment Agency guidance. This equally applies to the inverted siphons proposed at Blakenhall South and Half Moon. These structures are, therefore, unlikely to have a significant effect on flood risk.

15.4.30 The permanent watercourse realignments associated with the crossings at Blakenhall drop inlet culvert, Gonsley drop inlet culvert and Blakenhall South inverted siphon would have equivalent capacity to the existing channels downstream and would be designed such that any existing field subsurface drainage systems can be connected-in. These diversions are, therefore, unlikely to have a significant adverse effect on flood risk and land drainage.

15.4.31 Thus, compliance with the draft CoCP and the proposed consenting process should ensure that there are no significant construction-related effects on flood risk or land drainage.

15.4.32 The design aim for the proposed 11 permanent balancing ponds would be to ensure that the peak rate of runoff from the Proposed Scheme is attenuated to present greenfield runoff rates, including an explicit allowance for the projected impacts of future climate change on peak rainfall intensities, in accordance with current

Environment Agency guidance. None of the potential effects associated with these features and their associated receptors have been assessed as being significant.

15.4.33 A series of six balancing ponds are currently located along the eastern side of the B5071 Jack Mills Way/Crewe Road between the A500 Shavington Bypass and Gresty Brook. These collect surface water runoff from this length of the B5071 Jack Mills Way and the Basford West mixed use development site that is currently being constructed in stages with plots located on both sides of the road. Four of the six ponds would be lost as a result of the HS2 Crewe IMD. The remaining two ponds would be incorporated into the design and would continue to collect surface water from certain sections of road and parts of the development area. An additional balancing pond is to be provided, located to the south of the HS2 Crewe IMD, which would collect surface water runoff from the IMD itself. Unless provision is also made to ensure that the surface water runoff from all areas of the remaining Basford West development and relevant sections of the B5071 Jack Mills Way continues to be attenuated, the proposals have the potential to have a moderate adverse effect on downstream flood risk.

Other mitigation measures

15.4.34 Additional mitigation measures may be required to further reduce the temporary and permanent impacts of construction stage activities, particularly with regard to demonstrating that:

- all reasonably practicable measures have been taken to mitigate the impacts of the proposed culverts on the WFD element status of the relevant watercourses; and
- the proposals would not result in significant increases in flood risks from any source for a range of events up to and including the 1 in 100 annual probability, including allowance for climate change.

15.4.35 The precise form of these will be site specific and based on the outcome of site survey, hydraulic modelling work and ongoing consultation with the Environment Agency and the LLFA, as appropriate, and reported in the formal EIA Report.

15.4.36 These surveys will include inspection of watercourses affected by culvert crossings so that the relative value of these watercourses can be confirmed and an approach to mitigating the impacts of these culverts on the natural hydromorphology of these watercourses can be developed.

15.4.37 Mitigation for potential impacts on the two licensed groundwater abstractions at Grange Farm will be developed following further investigation.

15.4.38 The potential spring features near Swill Brook, west of Swill Brook, south of Yew Tree Farm, near Ash Tree Farm, west of Chorlton, east of Manor Farm and near Basford House will be inspected, and if they are confirmed as being of high value, a mitigation strategy will be developed.

15.4.39 The design basis for the existing Basford West mixed use development site and local highway network will be investigated, in consultation with CEC, and suitable measures identified to ensure that surface water runoff from this development area

would continue to be balanced to control rates of runoff into Gresty Brook. The outcome of this will be reported in the formal EIA Report.

Summary of likely residual significant effects

15.4.40 Without the additional mitigation summarised above the anticipated residual significant effects related to construction would be as follows:

- permanent major adverse effect on the two private licensed groundwater abstractions at Grange Farm;
- temporary major adverse effects on the potential spring features west of Chorlton, near Swill Brook and near Basford House, and moderate adverse effects on the potential spring features east of Manor Farm, south of Yew Tree Farm, near Ash Tree Farm and west of Swill Brook;
- permanent major adverse effects on the potential spring features west of Chorlton and near Basford House and moderate adverse effects on the potential spring features east of Manor Farm, south of Yew Tree Farm, near Ash Tree Farm, west of Swill Brook and near Swill Brook;
- permanent moderate adverse effects on watercourse hydromorphology resulting from construction of Blakenhall drop inlet culvert, Gonsley drop inlet culvert, Blakenhall south inverted siphon, WCML Den Lane culvert, WCML Betley South culvert and WCML Betley North culvert;
- permanent major adverse effect on watercourse hydromorphology resulting from construction of Half Moon inverted siphon;
- permanent moderate adverse effect from the construction of the Basford West culvert under the HS2 Crewe IMD, which limits the future hydromorphological potential of the original watercourse in this area; and
- permanent moderate adverse effect on downstream flood risk resulting from loss of the four existing balancing ponds that are designed to attenuate surface water runoff from the existing Basford West development site and parts of the B5071 Jack Mills Way.

15.4.41 It is currently anticipated that it should be possible to develop the means of mitigating these impacts, to ensure that there are no residual significant effects.

15.5 Effects arising from operation

Avoidance and mitigation measures

15.5.1 Generic examples of design measures that would reduce potentially significant adverse effects on the quality of flow and characteristics of surface water and groundwater bodies during operation and management of the Proposed Scheme are described in Volume 1. A draft operation and maintenance plan for water resources and flood risk will be prepared and included in the formal EIA Report.

Assessment of impacts and effects

15.5.2 The principal issue of concern during operation is the potential for accidental spillages to occur that result in the release of contaminants into the water environment. This issue will be reported on in the formal EIA on a route-wide basis. No adverse effects of significance related to water quality are anticipated from operation of the Proposed Scheme at this stage of the assessment.

15.5.3 The design would take into account the policies in the National Planning Policy Framework (NPPF) and would aim to ensure that the Proposed Scheme is safe from flooding without increasing flood risk elsewhere. Evidence of application of the Sequential Test and Exception Tests in NPPF will be provided in the formal EIA. No adverse effects of significance related to flood risk are anticipated from operation of the Proposed Scheme at this stage of the assessment.

15.5.4 Sustainable drainage systems would be used where reasonably practicable. These would also help to remove any suspended material within runoff from the Proposed Scheme through filtration, vegetative adsorption or settlement. The drainage systems proposed would ensure that the Proposed Scheme has no adverse effects of significance to the quantity and quality of water draining from the Proposed Scheme during its operational phase.

15.5.5 The operational impacts of the Proposed Scheme on surface water and groundwater bodies are unlikely to be significant, once the construction stage mitigation measures outlined above have been implemented. A route-wide WFD compliance assessment will be conducted and reported in the formal EIA Report.

Other mitigation measures

15.5.6 The route-wide assessments of accidental spillage risks, WFD compliance and alignment with the flood risk policies within NPPF will be reported in the formal EIA.

Summary of likely residual significant effects

15.5.7 It is currently not anticipated that there would be any significant residual effects on water resources and flood risk resulting from operation of the Proposed Scheme. However, until the route-wide assessments of accidental spillage risks, WFD compliance and alignment with the flood risk policies in NPPF have been completed, the risk of the Proposed Scheme resulting in significant effects cannot be discounted. The results of these assessments will be reported in the formal EIA.

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