HS2

October 2018

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

## Working Draft Environmental Statement

## Volume 2: Community Area report

## MA04: Broomedge to Glazebrook

HS2

October 2018

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

## Working Draft Environmental Statement

## Volume 2: Community Area report

## MA04: Broomedge to Glazebrook

Department for Transport

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

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

Telephone: 08081 434 434

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.hs2.org.uk

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

AECOM CAPITA lineco forward together

ARUP + ERM | FOSTER + PARTNERS | JACOBS RAMBOLL | TYPSA | COSTAIN

MWJV

High Speed Two (HS2) Limited has actively considered the needs of blind and partially sighted people in accessing this document. The text will be made available in full on the HS2 website. The text may be freely downloaded and translated by individuals or organisations for conversion into other accessible formats. If you have other needs in this regard please contact High Speed Two (HS2) Limited.



recycle

Printed in Great Britain on paper containing at least 75% recycled fibre.

# Contents

## List of figures

**List of tables**

# Preface

## The working draft Environmental Statement

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

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

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

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

## Consultation on the working draft Environmental Statement

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

# Structure of the HS2 Phase 2b working draft Environmental Statement

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

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

The working draft ES comprises the following documents:

## Non-technical summary

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

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

## Glossary of terms and list of abbreviations

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

## Volume 1: Introduction and methodology

This provides:

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

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

## Volume 2: Community area reports and map books

These cover the following community areas:

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

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

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

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

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

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

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

## Volume 3: Route-wide effects

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

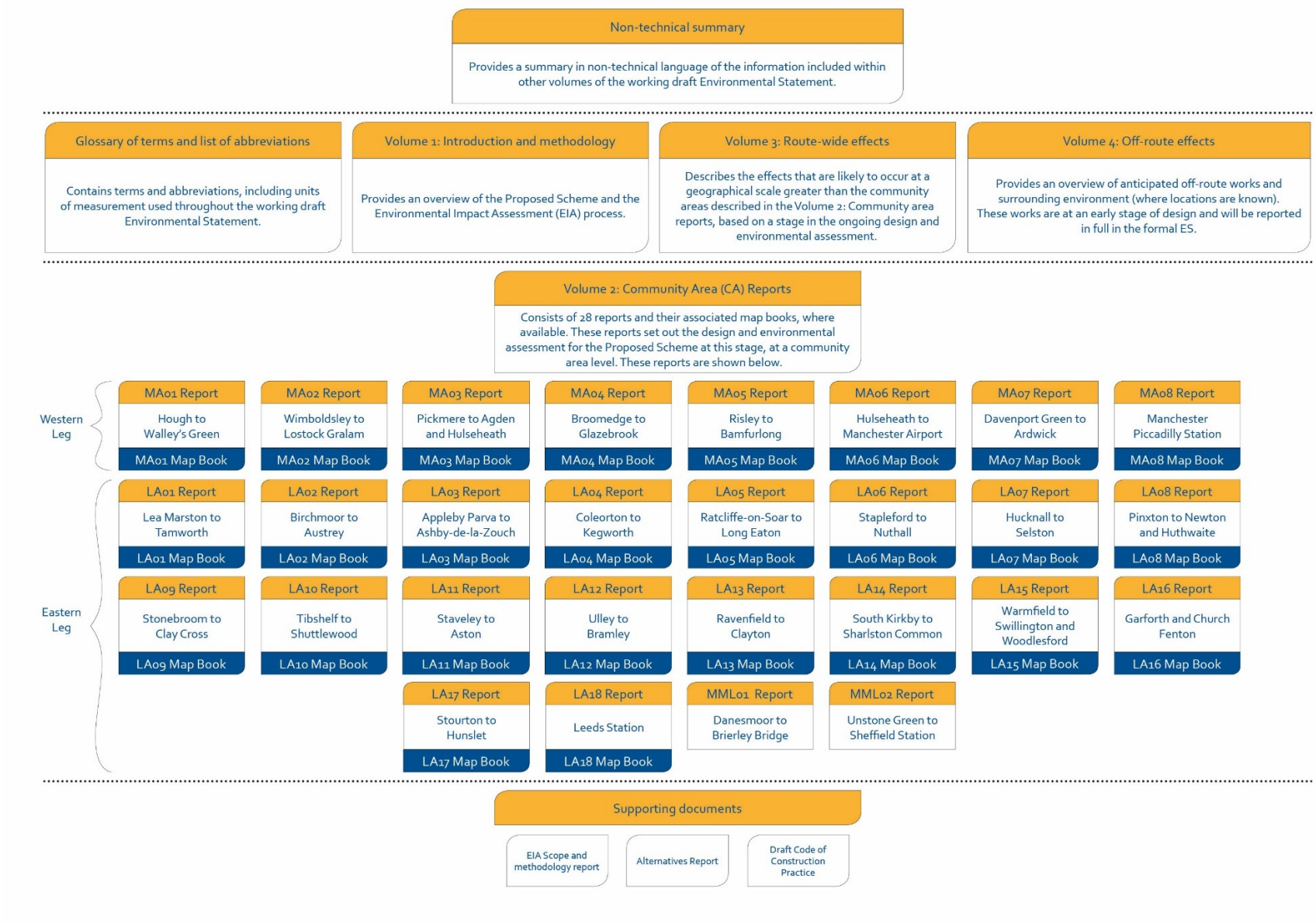
## Volume 4: Off-route effects

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

## Supporting documents

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

Figure 1 Structure of the working draft Environmental Statement



# 1 Introduction

## 1.1 Introduction to HS2

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

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

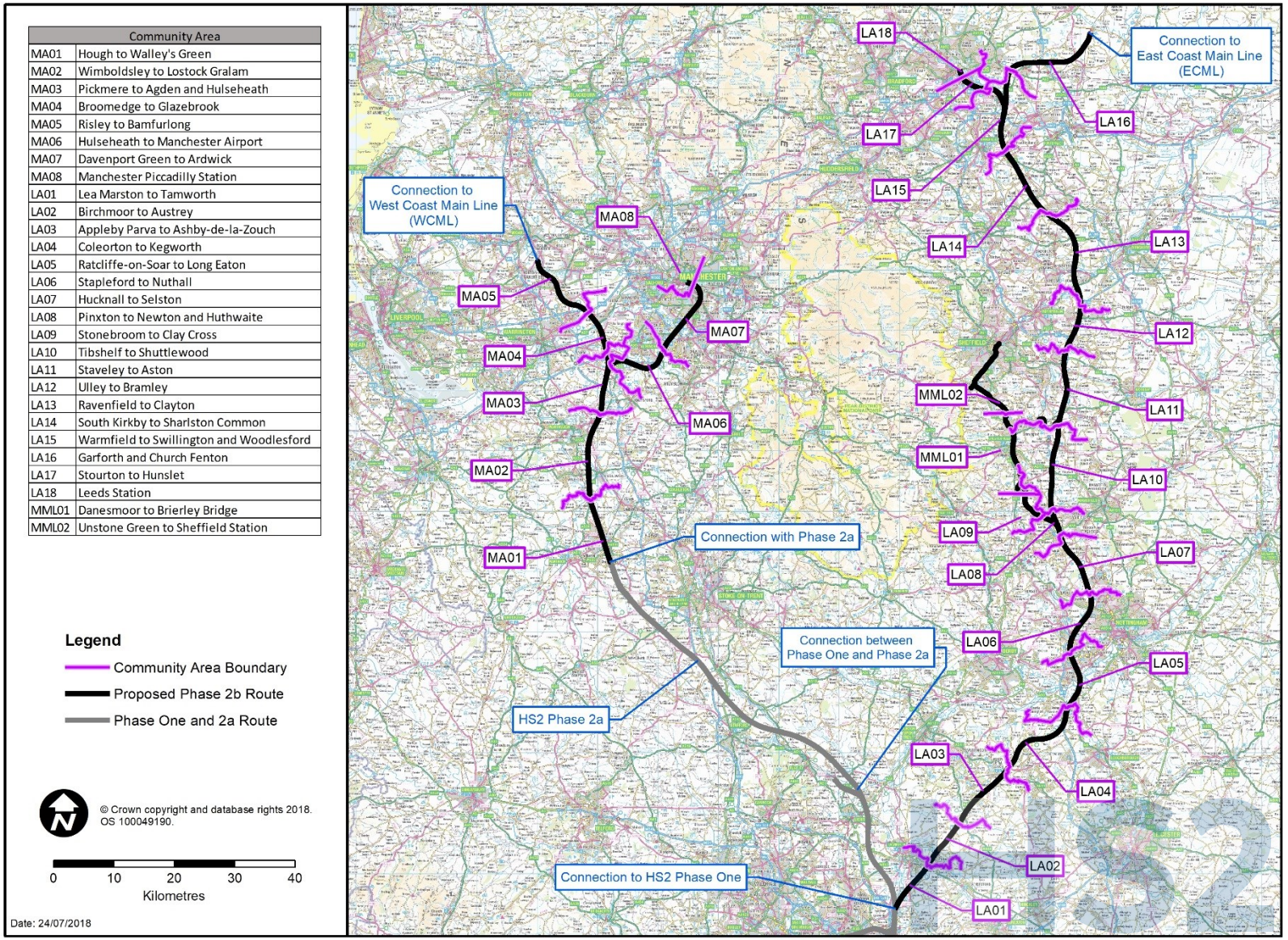
1.1.3 Phase Two of HS2 will extend the route from Phase One in the West Midlands to the north-west to Manchester (approximately 80km (50 miles) with connections to the West Coast Main Line (WCML) at Crewe and Golborne, and to the north-east to Leeds with a connection to the Erewash Valley Line and Midland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

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

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

1.1.6 For environmental assessment and community engagement purposes, the Proposed Scheme has been divided into 28 community areas (CA). These are shown in Figure 2. This CA report relates to the Broomedge to Glazebrook area (CA number MA04) which is located on the western leg of the Proposed Scheme.

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



## 1.2 Purpose of this report

1.2.1 This working draft ES sets out the preliminary environmental information and the key features of a point in time design for the Proposed Scheme. It provides a description of the design of the Proposed Scheme, environmental baseline information, and the likely impacts (and where practicable, the significant effects) of the construction and operation of the Proposed Scheme on the environment within the Broomedge to Glazebrook area. The report also describes the proposed mitigation measures that have been identified, at this stage, to avoid, reduce or manage the likely significant adverse effects of the Proposed Scheme on the environment within the area, along with proposed monitoring measures.

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

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

1.2.4 The likely significant environmental effects of the Proposed Scheme will be described in the formal ES to be deposited in accordance with the requirements of Parliamentary Standing Order 27A (SO27A)[1,2]. It is possible that the effects and mitigation described in the formal ES may differ from those presented in this working draft ES, due to the provisional nature of the environmental and design information that is currently available and as a result of consultation on the Proposed Scheme, as appropriate.

1.2.5 The working draft ES has been undertaken on the assumption that the policies adopted for Phase One and Phase 2a will also apply to Phase 2b. The assessment also assumes that any general mitigation measures required as a result of those policies are implemented appropriately in the delivery and operation of the Proposed Scheme. Where policies are referred to in this working draft ES it is on this basis.

## 1.3 Structure of this report

1.3.1 This report is divided into the following sections:

- Section 1 – an introduction to HS2 and the purpose and structure of this report;
- Section 2 – overview of the community area, description of the Proposed Scheme within the community area and its construction and operation, and a description of the local alternatives considered;

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

- Section 3 – consultation and stakeholder engagement; and
- Sections 4 to 15 – an assessment of the following environmental topics:
  - agriculture, forestry and soils (Section 4);
  - air quality (Section 5);
  - community (Section 6);
  - ecology and biodiversity (Section 7);
  - health (Section 8);
  - historic environment (Section 9);
  - land quality (Section 10);
  - landscape and visual (Section 11);
  - socio-economics (Section 12);
  - sound, noise and vibration (Section 13);
  - traffic and transport (Section 14); and
  - water resources and flood risk (Section 15).

1.3.2 Each environmental topic section (Sections 4 to 15) comprises:

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

1.3.3 Environmental effects have been assessed in accordance with the methodology set out in Volume 1 and the EIA Scope and Methodology Report (SMR)[3].

1.3.4 The maps relevant to the Broomedge to Glazebrook area are provided in a separate corresponding document entitled Volume 2: MA04 Map Book, which should be read in conjunction with this report.

1.3.5 The Proposed Scheme described in this report is that shown on the Map Series CT-05 (construction) and CT-06 (operation) (Volume 2: MA04 Map Book). There is some flexibility during detailed design to alter the horizontal and vertical alignments and other details within the limits shown on the plans and sections submitted to Parliament and as set out in the Bill, and this flexibility is included within the scope of

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

the environmental assessment. Further explanation is provided in Volume 1, Section 1.

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

# 2 Overview of the area and description of the Proposed Scheme

## 2.1 Overview of the area

### General

2.1.1 The Broomedge to Glazebrook area covers an approximately 7.3km section of the route of the Proposed Scheme passing through the parishes of Agden, Lymm, Warburton, Partington and Rixton-with-Glazebrook, within the local authority areas Warrington Borough Council (WBC) and Trafford Metropolitan Borough Council (TMBC). The southern boundary of this area lies within Agden parish. The boundary between the Rixton-with-Glazebrook parish and Birchwood parish forms the northern boundary of this section. Whilst the Proposed Scheme does not extend into Salford the extent of the area does.

2.1.2 As shown in Figure 3, the Pickmere to Agden and Hulseheath area (MA03) lies to the south and the Risley to Bamfurlong area (MA05) lies to the north.

### Settlement, land use and topography

2.1.3 The area is predominantly rural in character, with agriculture being the main land use with a number of towns, villages and a scattering of isolated dwellings and farmsteads. Much of the area encompasses mainly flat or gently undulating arable and pasture land and watercourses. The area has open floodplain river valley landscapes, with occasional farmed former moss lands. Towards the north and east of the area the agricultural land use is interspersed with pockets of current and former industrial land, including operational and dismantled railways, canals and the industrial facilities at Partington, Carrington and Cadishead.

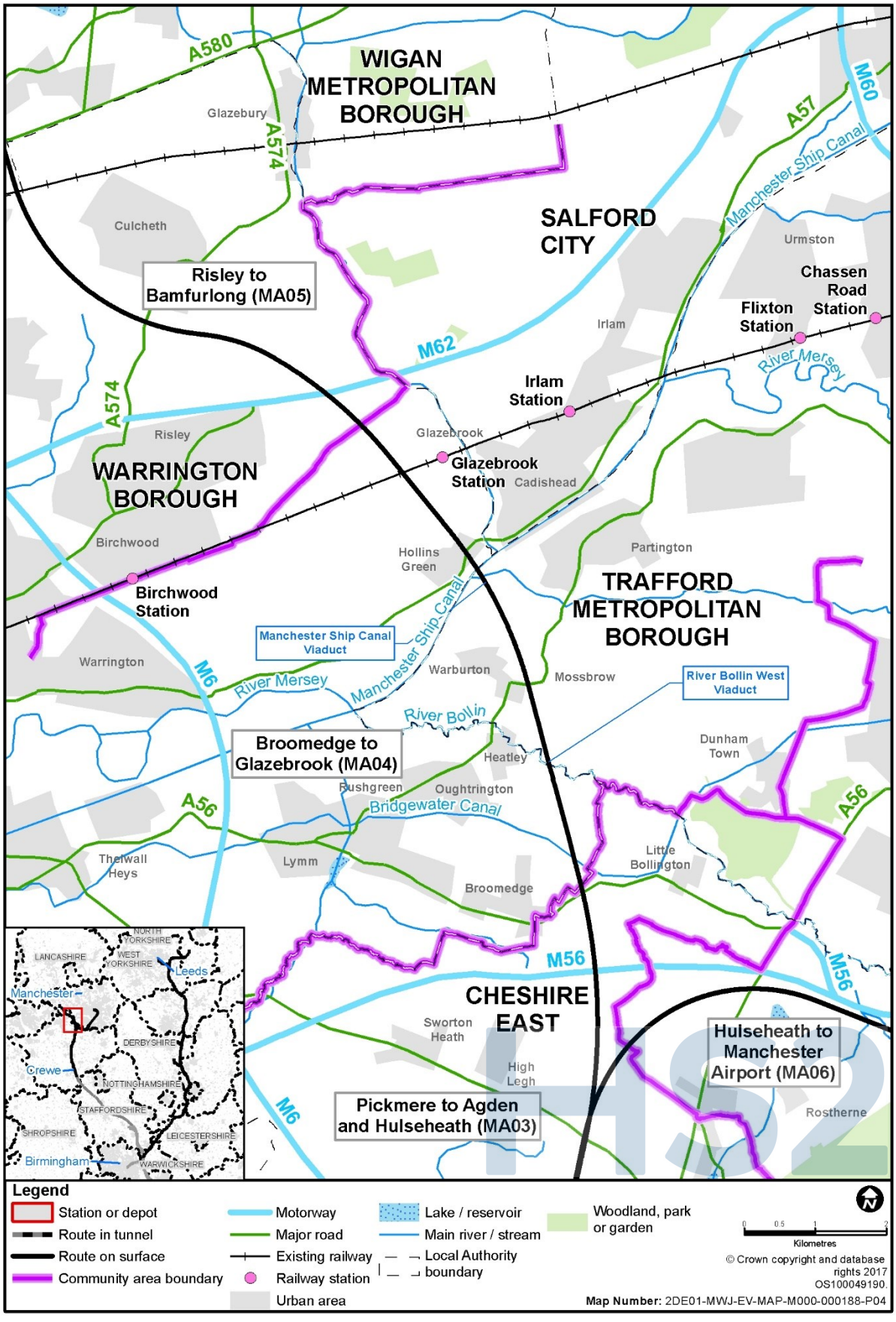
2.1.4 At the southern end of the Broomedge to Glazebrook area are the settlements of Broomedge and Heatley. Further to the west is the larger village of Lymm and the town of Warrington. The town of Altrincham is located to the east of the Broomedge to Glazebrook area and further to the east is the town of Sale.

2.1.5 The settlements of Warburton and Mossbrow are located towards the central part of the area.

2.1.6 Towards the north of the area are the settlements of Hollins Green and Glazebrook with the town of Partington to the south of the Manchester Ship Canal and Cadishead, which is a suburb of the City of Salford, and Irlam to the east.

2.1.7 The topography throughout the area is generally flat or gently undulating at around 10 to 20m above Ordnance Datum (AOD). Land to the north of Hollins Green is characterised by pockets of moss land and reclaimed agricultural land from the mosses. Land to the north of Hollins Green is characterised by pockets of moss land and agricultural land reclaimed from the mosses.

Figure 3: Community area context map



## Key transport infrastructure

2.1.9 The principal highways within this area include the M6 which provides links to Preston and Lancaster to the north and Newcastle-under-Lyme and Stoke-on-Trent to the south. The M62 which connects Liverpool, Manchester and Leeds and routes further to the east. The M62 runs east west to the north of the area. The M56 which connects Manchester, Chester, Ellesmere Port and links further west into North Wales, also runs east west to the south of the southern boundary of this area. The A57 Manchester Road and the A56 Lymm Road provide local links west to Warrington and the wider transport network including surrounding towns such as Partington to the north, Altrincham to the east and the village of Lymm to the west of the area. Other local transport routes include the A6144 Bent Lane/Paddock Lane/Warburton Lane connecting Heatley to Partington. Local roads include Agden Lane, Warrington Lane, Spring Lane and Wet Gate Lane.

2.1.10 The route of the Proposed Scheme would cross the Liverpool to Manchester (via Warrington Central) Line to the south of the M62 between Dam Lane and Glazebrook. Dam Head Lane. Glazebrook railway station lies approximately 580m east of the route of the Proposed Scheme which offers direct services to both Liverpool and Manchester.

2.1.11 The Bridgewater Canal is located in the south of the area. The Manchester Ship Canal, which is a canalised section of the River Mersey, is located in the central section of this area. There are several public rights of way (PRoW) in the area including public footpaths, bridleways and promoted routes[4] as well as other local access roads which provide important links between scattered dwellings and surrounding villages. In the Agden Bridge area, the Cheshire Ring Canal walk is a long-distance footpath, linking the Preston Brook to the south west and Castlefield to the north-east. The Trans Pennine Trail is another promoted footpath located in the central section of the area running in an east-west direction and forms part of the National Cycle Network - Route 62. The Mersey Valley Timberland Trail and the Glazebrook Timberland Trail are also a long distance footpaths. The Mersey Valley Timberland Trail starts at Stage Lane to the west of Lymm. The Glazebrook Timberland Trail starts at the A57 Manchester Road and runs in a north south direction to Leigh.

## Socio-economic profile

2.1.12 The Broomedge to Glazebrook area falls within the administrative areas of WBC and TMBC. Within the WBC area, the professional, scientific and technical sector accounts for the largest share of businesses (21%). The next largest sectors are construction, retail and business administration and support services (9% each), followed by information and communication (7%)[5].

[4] Promoted route refers to those PRoW which are "promoted" destinations in their own right as a recreational resource
[5] Office for National Statistics (2017) UK Business Count – Local Units. Available online at https://www.nomisweb.co.uk

2.1.13 According to the Annual Population Survey (2016)[6], the employment rate[7] within the WBC area was 76% (100,900 people), and unemployment was 3.2%.

2.1.14 According to the Annual Population Survey (2016)[8], 38% of WBC area residents aged 16-64 were qualified to National Vocational Qualification Level 4 (NVQ4) and above, while 7% of residents had no qualifications.

2.1.15 Within the TMBC area, the professional, scientific and technical sector accounts for the largest proportion of businesses (18%). Financial and insurance sectors account for the second largest (11%), followed by business administration and support services (10%)[9].

2.1.16 According to the Annual Population Survey (2016)[10], the employment rate[11] within the TMBC area was 80% (118,400 people), and unemployment was 2.7%, lower than in Warrington.

2.1.17 According to the Annual Population Survey (2016)[12], 52% of TMBC area residents aged 16-64 were qualified to National Vocational Qualification Level 4 (NVQ4) and above, while 5% of residents had no qualifications.

## Notable community facilities

2.1.18 The main concentrations of community facilities are in the larger settlements of Lymm, Partington, Cadishead and Irlam. Broomedge, Oughtrington, Rushgreen, Heatley, Mossbrow, Warburton, Hollins Green and Glazebrook are smaller villages and hamlets that provide a smaller number of local services.

2.1.19 Lymm is a large village with the centre of the village designated as a Conservation Area. Notable community facilities in the village centre include primary schools, a secondary school, places of worship and community centre.

2.1.20 Partington is a town in the east of the area. Community facilities include primary schools, secondary schools, one of which contains youth and recreation facilities, community centres, places of worship and a health centre.

2.1.21 Cadishead and Irlam are located north of the Manchester Ship Canal. Notable community facilities in the Cadishead and Irlam area include several primary schools, a secondary school, a college, places of worship, a health centre and local libraries.

2.1.22 Community facilities within the village of Hollins Green include the St Helen's Church of England primary school, St Helen's Church, Rixton-with-Glazebrook Community Hall, the Hollinfare Cemetery, a scouts building and a post office. There are also two public houses located in the village; Ye Old Red Lion and The Black Swan, the latter has an outdoor play area.

[6] Annual Population Survey (2016), NOMIS. Available online at https://www.nomisweb.co.uk
[7] The proportion of residents aged 16-64 that is in employment.
[8] Annual Population Survey (2016), NOMIS. Available online at https://www.nomisweb.co.uk
[9] Office for National Statistics; (2017) UK Business Count – Local Units. Available online at https://www.nomisweb.co.uk
[10] Annual Population Survey (2016), NOMIS. Available online at https://www.nomisweb.co.uk
[11] The proportion of residents aged 16-64 that is in employment.
[12] Annual Population Survey (2016), NOMIS. Available online at https://www.nomisweb.co.uk

## Recreation, leisure and open space

2.1.23 The Broomedge to Glazebrook area is a predominantly rural area, characterised by open space, woodland, water ways and farmland. It is crossed by several promoted public rights of way (PRoW), including:

- the Mersey Valley Timberland Trail, which passes through Lymm;
- the Cheshire Ring Canal Walk, which follows the Bridgewater Canal and also passes through Lymm;
- the Trans Pennine Trail long distance footpath which also forms part of the National Cycle Route 62, which passes north of Heatley, Oughtrington and Lymm;
- the Bollin Valley Way which runs along the Manchester Ship Canal towpath; and
- the Glazebrook Trail, which passes west of Cadishead.

2.1.24 Waterways which pass through the area include: the Bridgewater Canal, the River Bollin, Red Brook, the Manchester Ship Canal, and the Glaze Brook.

2.1.25 Other notable recreation, leisure and open space facilities include: Spud Wood, south of Oughtrington; Ridgeway Grundy Memorial Park, Lymm Dam and Lymm Golf Club, all in Lymm; Heatley Flash fishing lake; Coroners Wood, west of Partington; and the Rixton Clay Pits Site of Special Scientific Interest (SSSI) and Nature Reserve, east of Hollins Green.

2.1.26 Additionally, there are several sports fields, clubs and recreational grounds in several of the towns and villages in the Broomedge to Glazebrook area, which offer leisure opportunities to residents.

## Policy and planning context

### *Planning framework*

2.1.27 Volume 1 provides an overview of the policy case for HS2. Relevant development plan documents and policies have been considered in relation to environmental topics, as part of considering the Proposed Scheme in the local context.

2.1.28 The following local policy documents have been considered and referred to where appropriate to the assessment:

- adopted Warrington Local Plan Core Strategy 2012-2027 (2014)[13];
- adopted Trafford Local Plan: Core Strategy 2011-2026 (2012)[14];

[13] Warrington Local Plan Core Strategy 2012-2027 (Adopted 2014). Available online at: https://www.warrington.gov.uk/info/200564/planning_policy/1903/local_plan
[14] Trafford Local Plan: Core Strategy 2011-2026 (Adopted 2012). Available online at: http://www.trafford.gov.uk/planning/strategic-planning/local-plan/core-strategy.aspx

- adopted Trafford Unitary Development Plan 2002-2016 (saved policies) (2006)[15];
- adopted Greater Manchester Joint Waste Development Plan Document 2012-2027 (2012)[16];
- adopted Greater Manchester Joint Minerals Development Plan Document 2012-2027 (2013)[17];
- adopted Warrington Local Transport Plan 3 2011-2030 (2011)[18]; and
- adopted Greater Manchester Transport Strategy 2040 (2017)[19].

2.1.29 Emerging policies are not generally included within this report unless a document has been submitted to the Secretary of State for Examination.

### *Committed development*

2.1.30 Committed developments are defined as developments with planning permission and sites allocated for development, or safeguarded for minerals in adopted development plans, on or close to the land required for the Proposed Scheme.

2.1.31 Where it is likely that committed developments would have been completed by 2023, these would be identified as 'future baseline' schemes and taken into account in the formal ES.

2.1.32 Where there are committed developments that are considered likely to be constructed between 2023 and 2033, i.e. at the same time as the Proposed Scheme, they would be considered as receptors for the operation of HS2, but also potentially to give rise to cumulative impacts with the Proposed Scheme during construction. Any cumulative impacts and likely significant effects will be reported in the formal ES.

2.1.33 Planning applications yet to be determined at the time of the formal ES and sites that are proposed allocations in development plans that have yet to be adopted, on or close to the Proposed Scheme, are termed 'proposed developments'. These will not be included in the assessment in the formal ES.

## Ongoing design development

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

[15] Trafford Unitary Development Plan 2002-2016 (saved policies) (Adopted 2006). Available online at: http://www.trafford.gov.uk/planning/strategic-planning/unitary-development-plan.aspx
[16] Greater Manchester Joint Waste Development Plan Document 2012-2027 (Adopted 2012). Available online at: http://www.gmwastedpd.co.uk/doclib.html#Adopted_Waste_Plan_Documents
[17] Greater Manchester Joint Minerals Development Plan Document 2012-2027 (Adopted 2013). Available online at: http://www.gmmineralsplan.co.uk/docs.html#ADOPTED_MINERALS_PLAN
[18] Warrington Local Transport Plan 3 2011-2030. Available online at: https://www.warrington.gov.uk/downloads/download/367/local_transport_plan_3
[19] Greater Manchester Transport Strategy 2040 (Adopted 2017). Available online at: https://www.tfgm.com/2040

- review of the proposed length, heights and alignment of viaducts and other river and canal crossing structures and associated replacement floodplain storage areas;
- temporary and permanent utility diversions;
- refinement of the realignment of roads and PRoW crossing the route of the Proposed Scheme;
- refinement of drainage features required for rail and highways;
- refinement of maintenance access routes, 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 locations and site haul routes; and
- refinement of auto-transformer station locations.

## 2.2 Description of the Proposed Scheme

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

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

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

### Overview

2.2.4 The route of the Proposed Scheme through the Broomedge to Glazebrook area would be 7.3km long and lies within the WBC and TMBC areas. The route would extend from the boundary with the Pickmere to Agden and Hulseheath area (MA03) northwards to the east of Lymm, passing west of Partington and ending at the boundary with the Risley to Bamfurlong area (MA05).

2.2.5 This section of route is illustrated on maps CT-06-322b to CT-06-326a in the Volume 2: MA04 Map Book.

2.2.6 All dimensions in the sections below are approximate.

2.2.7 In the Broomedge to Glazebrook area, the route of the Proposed Scheme would be carried on the following features:

- viaducts for a total length of 2.2km (the River Bollin West, and Manchester Ship Canal viaducts);

- cuttings for a total length of 1.1km (the Warburton cutting); and
- embankments for a total length of 4km (Lymm, Heatley, Warburton and Glazebrook embankments).

2.2.8 The Proposed Scheme is described in three separate sections below.

2.2.9 In general, features are described along the route of the Proposed Scheme from south to north and to the eastern and western sides of the route as they cross the route of the Proposed Scheme, as shown on Map Series CT-06 in the Volume 2: MA04 Map Book.

### *Agden to River Bollin*

2.2.10 The route of the Proposed Scheme would continue from the Pickmere to Agden and Hulseheath area (MA03) north towards the River Bollin valley. Most of this section would be on embankment. The rest of this section would either be on underbridge or a viaduct, including the crossings over the River Bollin and the Trans Pennine Trail long distance footpath and National Cycle Route 62.

2.2.11 This section of the route is illustrated on maps CT-06-322b to CT-06-323 in the Volume 2: MA04 Map Book.

2.2.12 Key features of this 2km section would include:

- continuation of Lymm embankment from the Pickmere to Agden and Hulseheath area (MA03) to the south would be 1.7km in length and up to 14m in height in this section with associated earthworks and landscape mitigation planting to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: map CT-06-322b F6 to CT-06-323 F7);
- landscape mitigation planting to provide visual screening and to help integrate the Proposed Scheme into the surrounding landscape. The planting would run parallel to the route of the Proposed Scheme, from Agden Bridge to the southern base of the River Bollin West viaduct (see Volume 2: map CT-06-322b F6 to CT-06-323 F7);
- closure of Agden Lane where it would cross the route of the Proposed Scheme with access to properties retained on both the southern and northern sides of the route. Users would be diverted 170m south along Warrington Lane and then onto the A56 Lymm Road (see Volume 2: map CT-06-322b G6);
- Agden Lane culvert, 145m in length and 230m south of the Bridgewater Canal, for diversion of an unnamed watercourse under the route of the Proposed Scheme (see Volume 2: map CT-06-322b G6);
- landscape earthworks between A56 Lymm Road underbridge and Spring Lane underbridge to provide visual screening local properties and to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: map CT-06-322b H6);
- an area of woodland habitat creation located between Warrington Lane, the A56 Lymm Road in Pickmere to Agden and Hulseheath area (MA03) and the

Bridgewater Canal to provide replacement habitat. The majority of this habitat creation area is location in the Pickmere to Agden and Hulseheath area (see Volume 2: map CT-06-322b F9 to G7);

- a noise fence barrier, 200m in length and 2m in height, extending from 200m north of the A56 Lymm Road to the southern abutment of the Bridgewater Canal underbridge. The noise fence barrier would be on the eastern side of the route to provide acoustic screening for local properties and users of the Bridgewater canal (see Volume 2: map CT-06-322b H6 to I6);
- the Bridgewater Canal underbridge, 107m in length with a clearance height of 3m. The Bridgewater Canal, Warrington Lane and the Lymm Footpath 43/Cheshire Ring Canal Walk would cross the route of the Proposed Scheme via the underbridge (see Volume 2: map CT-06-322b H6);
- Spring Lane underbridge, 30m in length, with a clearance height of 4m diverting Spring Lane under the route of the Proposed Scheme on its existing alignment (see Volume 2: map CT-06-323 C8);
- landscape mitigation planting to provide a visual screen and integrate the Proposed Scheme into the surrounding landscape (see Volume 2: map CT-06-323 B7 to F7);
- a noise fence barrier, 320m in length and 2m in height, extending from 130m north of the Spring Lane underbridge to 280m south of the River Bollin. The noise fence barrier would be on the eastern side of the route to provide acoustic screening for local properties in Little Heatley (see Volume 2: map CT-06-323 C7 to E7);
- realignment of Wet Gate Lane 500m to the west of its current alignment and crossing the route of the Proposed Scheme via the Spring Lane underbridge. The existing Wet Gate Lane would be closed where it would cross the route of the Proposed Scheme. (see Volume 2: map CT-06-323 C6 to F7);
- a balancing pond for highway drainage on the eastern side of the route of the Proposed Scheme 20m north of the Little Heatley accommodation access. The pond would be accessed from Spring Lane and Little Heatley accommodation access (see Volume 2: map CT-06-323 D8);
- Little Heatley accommodation access between Spring Lane and Little Heatley, 450m in length, to the east of the route of the Proposed Scheme (see Volume 2: map CT-06-323 B8 to D8);
- the Wet Gate Lane auto-transformer station, on the western side of the route of the Proposed Scheme, 170m north of Spring Lane. Access would be provided via an access road from the Wet Gate Lane realignment (see Volume 2: map CT-06-323 F7);
- a balancing pond for highways drainage located on the western side of the route of the Proposed Scheme 60m south of the River Bollin (see Volume 2: map CT-06-323 F7);

- the River Bollin West viaduct, 400m in length and up to 15m in height; would take the route of the Proposed Scheme over the River Bollin (see Volume 2: map CT-06-323 F7 to H7); and
- an area of grassland habitat creation to the west of the route of the Proposed Scheme which would extend east under the River Bollin West viaduct and south of the River Bollin to provide replacement habitat (see Volume 2: map CT-06-323 F7 to F9).

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

2.2.14 Construction of this section would be managed from the Bridgewater Canal and Spring Lane satellite compounds, which are described in Section 2.3, and shown on map CT-05-322b and map CT-05-323 in the Volume 2: MA04 Map Book.

### *River Bollin to the Manchester Ship Canal*

2.2.15 The route of the Proposed Scheme would continue from the River Bollin West viaduct north towards the Manchester Ship Canal viaduct for a distance of 2km. The route of the Proposed Scheme would be located on embankment for 400m and then in cutting for 1km. The route of the Proposed Scheme would then continue on embankment and then into a 1km cutting before transferring back on to embankment for the approach to the Manchester Ship Canal viaduct.

2.2.16 This section of route is illustrated on maps CT-06-323 to CT-06-325 in the Volume 2: MA04 Map Book.

2.2.17 Key features of this 1.8km section would include:

- the Heatley embankment which would be 400m in length and up to 7m in height. Landscape earthworks and landscape mitigation planting on both sides of the embankment would provide a visual screen and integrate the Proposed Scheme into the surrounding landscape (see Volume 2: map CT-06-323 H7 to CT-06-324 E7);
- the creation of woodland habitat on the northern side of the River Bollin flood plain to the west of the route of the Proposed Scheme, to provide replacement habitat at Fox Covert and Meadows (see Volume 2: map CT-06-323 H7 to I4);
- a balancing pond for railway drainage, within an area of woodland habitat creation to the west of the route of the Proposed Scheme access would be from the A6144 Paddock Lane (see Volume 2: map CT-06-323 I7);
- diversion of two unnamed drainage channels at Fox Covert and Meadows (see Volume 2: map CT-06-323 I8);
- landscape earthworks and landscape mitigation planting would provide visual screening for local properties and users of Warburton Footpath 3 and integrate the Proposed Scheme into the surrounding landscape between the Heatley

embankment and A6144 Paddock Lane overbridge. The earthworks would also provide noise screening for local properties. (see Volume 2: map CT-06-323 H7 to CT-06-324 E7);

- realignment of Warburton Footpath 3, 200m to the north of its current alignment, crossing the route of the Proposed Scheme on the Warburton Footpath 3 accommodation overbridge (see Volume 2: map CT-06-323 to CT-06-325).
- Warburton Footpath 3 accommodation overbridge would be 45.5m in length and up to 10m in height and would provide accommodation access to Moss Brow Farm (see Volume 2: map CT-06-323 to CT-06-325);
- realignment of the existing A6144 Paddock Lane where it would cross the route of the Proposed Scheme with access to properties retained on both the western and southern sides of the route. The current A6144 Paddock Lane would be closed and users diverted 250m to the north over the A6144 Paddock Lane overbridge. (see Volume 2: map CT-06-324 E7);
- A6144 Paddock Lane overbridge, 45m in length and up to 11m high would carry the A6144 Paddock Lane over the route of the Proposed Scheme. The embankment to the overbridge would have landscape mitigation woodland planting to provide a visual screen and integrate the structure into the surrounding landscape (see Volume 2: map CT-06-324 E7);
- the Warburton cutting, which would be 1km in length, up to 4m in depth and 48m in width, would include landscape mitigation planting, to provide visual screening to the Saracens Head public house and residential properties, and to help integrate the cutting and associated infrastructure into the surrounding landscape. The Warburton cutting would also provide noise screening (see Volume 2: map CT-06-324 E7 to G7);
- an area of grassland habitat creation and landscape mitigation planting on the eastern side of the route of the Proposed Scheme north of A6144 Paddock Lane would provide replacement habitat and integrate the Proposed Scheme into the surrounding landscape (see Volume 2: map CT-06-32 E7 and E8);
- A6144 Paddock Lane culvert, 20m in length and 280m east of the route of the Proposed Scheme, for the diversion of an unnamed watercourse under the realigned A6144 Paddock Lane (see Volume 2: map CT-06-324 E9);
- a balancing pond for highway drainage located on the eastern side of the route of the Proposed Scheme and north of A6144 Paddock Lane (see Volume 2: map CT-06-324 F9);
- Warburton culvert, 40m in length and 400m north of the existing A6144 Paddock Lane to convey an unnamed watercourse/dry valley under the route of the Proposed Scheme (see Volume 2: map CT-06-324 F7);

- Warburton embankment, 300m long and up to 7m in height with landscape mitigation planting on both sides to help integrate the Proposed Scheme into the surrounding landscape (see Volume 2: map CT-06-324 G7 to H7);
- a balancing pond for track drainage located on the western side of the route of the Proposed Scheme with access from Park Road (see Volume 2: map CT-06-324 H6); and
- realignment of Warburton Footpath 11, 100m north of its current alignment for 500m, crossing the route of the Proposed Scheme on the northern side of the southern abutment and under the Manchester Ship Canal viaduct (see Volume 2: map CT-06-324 G8).

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

2.2.19 Construction of this section would be managed from the Manchester Ship Canal Viaduct North main compound and the River Bollin West viaduct, A6144 Paddock Lane, Warburton embankment satellite compound and the Manchester Ship Canal South and Central viaduct satellite compounds, which are described in Section 2.3, and shown on maps CT-05-324, to 326b Volume 2: MA04 Map Book.

### *Manchester Ship Canal to Glazebrook*

2.2.20 The route of the Proposed Scheme would then pass the settlements of Partington to the east, Coroners Wood, the Red Brook and the Manchester Ship Canal on viaduct. The route of the Proposed Scheme would then pass Hollins Green to the west. The rest of this section would be on embankment.

2.2.21 This section of route is illustrated on maps CT-06-323 to CT-06-326a in the Volume 2: MA04 Map Book.

2.2.22 Key features of this 3.5km section would include:

- the Manchester Ship Canal viaduct, 2km long and up to 28m in height. The viaduct would take the route of the Proposed Scheme over the Red Brook and the Manchester Ship Canal. The viaduct would also cross over A57 Manchester Road (see Volume 2: map CT-06-324 H7 to CT-06-325 I5);
- accommodation access for Warburton Park Farm located to the west of the route of the Proposed Scheme, would be provided under the viaduct (see Volume 2: map CT-06-324 I7);
- an area of woodland habitat creation running along the south side of Coroner's Wood to provide replacement habitat (see Volume 2: map CT-06-325 B7 to C3);
- an area of woodland habitat creation, south of the Manchester Ship Canal viaduct, between Millbank Hall Farm and existing sewage works to provide replacement habitat (see Volume 2: map CT-06-325 C8);

- a noise fence barriers 1km in length and up to 2m in height extending 50m north of the Red Brook to 100m north of Hollinfare Cemetery on the western side of the Manchester Ship Canal viaduct to provide acoustic screening for the cemetery and properties in Hollins Green (see Volume 2: map CT-06-325 C5 to I4);
- landscape mitigation planting around Hollinfare Cemetery, adjacent to the Manchester Ship Canal viaduct to provide visual screening (see Volume 2: map CT-06-325 F4);
- a strip of landscape mitigation planting crossing under the Manchester Ship Canal viaduct between B5212 Glazebrook Lane and Dam Lane at Hollins Green to provide visual screening for properties along Dam Lane (see Volume 2: map CT-06-325 F6 to G3);
- a balancing pond for highway drainage, located to the west of the route of the Proposed Scheme and on the western side of the route of the Proposed Scheme, 120m to the south of the Dam Head Lane diversion with access from Dam Lane (see Volume 2: map CT-06-325 H4);
- Dam Head Lane culvert, 20m in length and 100m west of the Manchester Ship Canal to divert Hollins Green Brook watercourse under the Dam Head Lane diversion (see Volume 2: map CT-06-325 I4);
- a balancing pond for highway drainage, to the east of the route of the Proposed Scheme, with access from the B5212 Glazebrook Lane (see Volume 2: map CT-06-325 J10);
- realignment of Rixton-with-Glazebrook Footpath 14, 300m south of its current alignment for 1km, crossing the route of the Proposed Scheme under Manchester Ship Canal viaduct and continue along the Dam Head Lane diversion (see Volume 2: map CT-06-323 to CT-06-326a);
- closure of Dam Head Lane where it would cross the route of the Proposed Scheme with access to properties retained on both the eastern and western sides of the route. Users would be diverted 600m south-east along the Dam Head Lane diversion. Access to properties would be retained on both the western and eastern sides of the route (see Volume 2: map CT-06-325 I3 to J8);
- Glazebrook embankment, 2km in length and up to 11m in height with landscaped earthworks, which would have slopes graded out to help integrate the Proposed Scheme into the surrounding landscape and provide a visual screen for residents of Glazebrook (see Volume 2: map CT-06-325 I4 to CT-06-326a H4);
- an area of woodland habitat creation, located east of the route of the Proposed Scheme, between the Dam Head Lane diversion and the Liverpool to Manchester (via Warrington Central) railway line to provide replacement habitat (see Volume 2: map CT-06-325 I5 to CT-06-326a C4);

- a balancing pond for railway drainage, west of the route of the Proposed Scheme with access from the Dam Head Lane diversion (see Volume 2: map CT-06-325 J4);
- the Glazebrook auto-transformer station located on the eastern side of the route of the Proposed Scheme, 100m to the north the Liverpool to Manchester (via Warrington Central) railway line. Access would be provided via an access road from the existing Dam Head Lane (see Volume 2: map CT-06-326a C3 and D3);
- the Glazebrook (Railway) underbridge, 32m in length and limited height clearance, would take the route of the Proposed Scheme over the Liverpool to Manchester (via Warrington Central) railway line (see Volume 2: map CT-06-326a D3);
- a balancing pond for railway drainage, located on the western side of the route of the Proposed Scheme with access from Church Farm accommodation access (see Volume 2: map CT-06-326a E3);
- realignment of the accommodation access for Church Farm, located to the east of the route of the Proposed Scheme. Access would be provided via the Glazebrook (railway) underbridge (see Volume 2: map CT-06-326a E3 to F4);
- grassland habitat creation adjacent to Holcroft Moss SSSI and would include species-rich grassland with fen type habitat around the edges of the SSSI (see Volume 2: Map CT-06-326b H7 to H3 and CT-06-326b H7 to CT-06-327 B7); and
- Glazebrook Moss culvert, 50m to the west of Holcroft Moss, which would take an unnamed watercourse under the route of the Proposed Scheme (see Volume 2: map CT-06-323 to CT-06-326a).

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

2.2.24 Construction of this section would be managed from the Manchester Ship Canal Viaduct North main compound, the Dam Head Lane satellite compound and Glazebrook Railway South satellite compound and Glazebrook Railway North satellite compounds, which are described in Section 2.3, and shown on map CT-05-325 and map CT-05-326a in the Volume 2: MA04 Map Book.

## Demolitions

2.2.25 As set out in Volume 1, as the design develops, it is likely that not all the properties reported within the assessment would need to be demolished, for example where not all of the land is required for permanent works.

2.2.26 At this stage of the design development, it is anticipated that demolition of five existing residential properties, would be required to construct the Proposed Scheme in the Broomedge to Glazebrook area. These could be needed for construction of the permanent features or, in some cases, to enable the construction works for the

Proposed Scheme. Demolitions would be managed from the same construction compounds as the permanent features with which they are associated. The identified demolitions are listed in Section 2.3 under the relevant construction compounds.

## 2.3 Construction of the Proposed Scheme

2.3.1 This section sets out the key construction activities that are envisaged to build the Proposed Scheme in the Broomedge to Glazebrook area. The construction arrangements described in this section provide the basis for the assessment presented in this ES.

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

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

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

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

### Code of Construction Practice

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

2.3.7 In addition, HS2 Ltd has produced a Community Engagement Framework[20] which sets out how HS2 Ltd and its contractors, as well as their sub-contractors, would undertake community engagement during the construction of the HS2 project. The framework is being implemented on Phase One of HS2 and is applicable to all phases of HS2.

2.3.8 The objectives of the framework include:

- to set out how HS2 Ltd and its contractors would undertake community engagement during the construction of the project;
- to provide clarity and reassurance to HS2 Ltd's stakeholders about how community engagement activity would be managed; and
- to help HS2 Ltd be a good neighbour to local communities, including by providing accurate and timely information about construction works and offering opportunities to influence them, where appropriate.

2.3.9 A draft CoCP has been prepared and is published alongside this document. It will remain a draft document through the Parliamentary process and the CoCP will be finalised by Royal Assent. The CoCP sets out measures to be implemented by the appointed construction contractor.

## Overview of the construction process

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

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

2.3.11 General information about the construction process is set out in more detail in Volume 1, Section 6, and the draft CoCP including:

- the approach to environmental management during construction and the role of the CoCP (Section 2);

[20] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/625971/hs2_community_engagement_framework.pdf

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

## Advance works

2.3.12 General information about advance works can be found in Volume 1, Section 6. Advance works 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;
- advance site access works;
- site establishment with temporary fence construction; along with soil stripping and vegetation removal; and
- utility diversions and new utility connections for facilities associated with the Proposed Scheme.

## Engineering works

### *Introduction*

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

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

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

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

### *General overview of construction compounds*

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

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

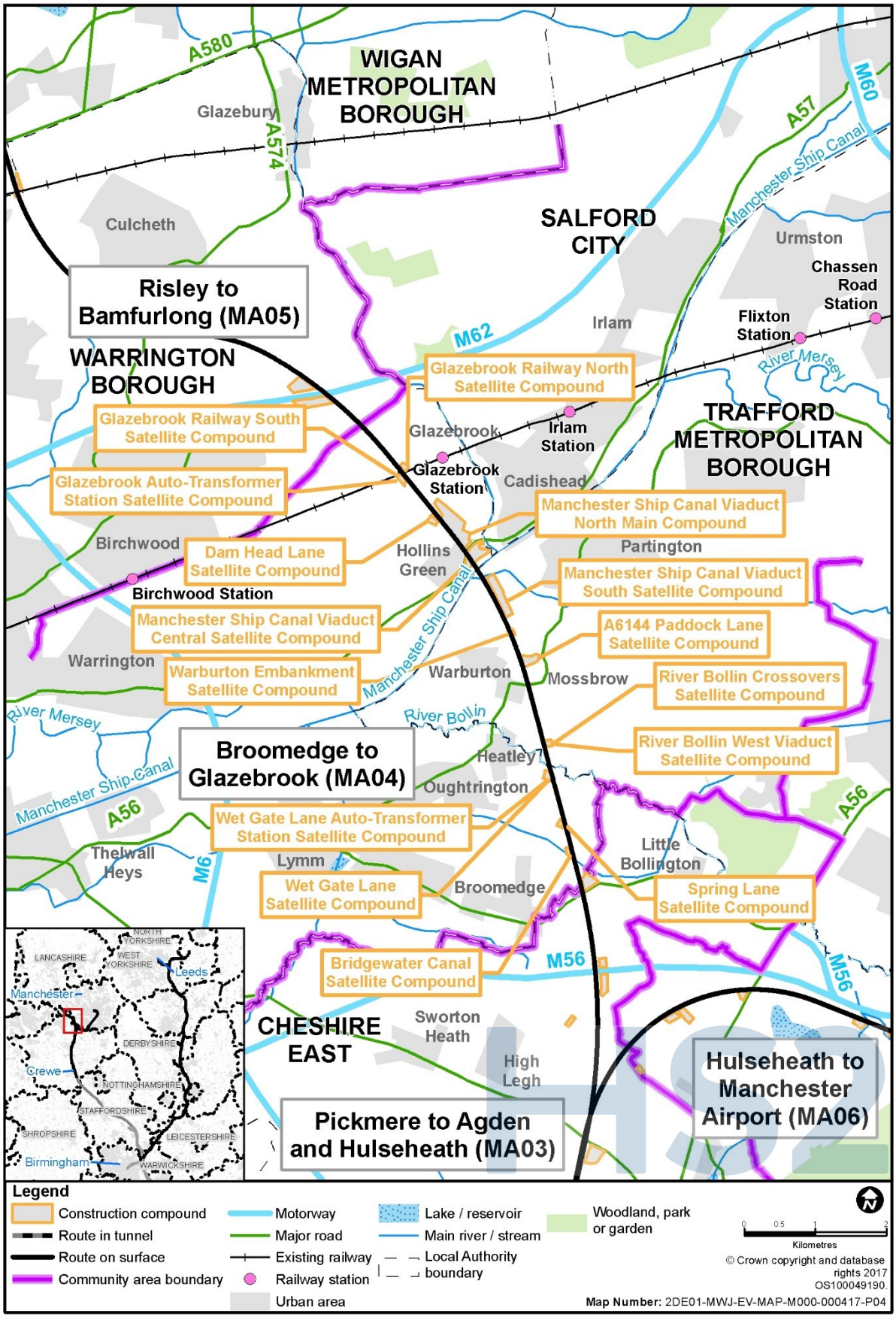
2.3.17 Satellite compounds would be used as the base to manage specific works along a section of the route. Depending on the nature and extent of the works to be managed, these satellite compounds could include office accommodation for staff, local storage for plant and materials, car parking for staff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

2.3.18 Eleven civil engineering satellite compounds would be located in the Broomedge to Glazebrook area, one of which would continue to be used as railway installation satellite compound following the completion of civil engineering works at that compound. Two additional satellite compounds for railway installation would be located in the Broomedge to Glazebrook area.

2.3.19 One main civil engineering compound, the Manchester Ship Canal Viaduct North main compound, would manage the 11 civil engineering satellite compounds in the Broomedge to Glazebrook area.

2.3.20 The location of construction compounds in the Broomedge to Glazebrook area is shown on Figure 4. Map Series CT-05 (in the Volume 2: MA04 Map Book) show in detail the locations of the construction compounds described below.

Figure 4: Location of construction compounds in the Broomedge to Glazebrook area



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

2.3.22 In the Broomedge to Glazebrook area there would be worker accommodation at the Manchester Ship Canal Viaduct North main compound for the construction workforce. Details of the location and duration of worker accommodation are provided in the description of the compound.

2.3.23 Soil stripped as part of the works, prior to being used when the land is reinstated, would be stored for the duration of construction. The location of top soil storage areas would generally be adjacent to compounds and areas of construction activity. These areas are referred to as material stockpiles and those adjacent to compounds are shown on maps CT-05-322b to CT-05-326a, in the Volume 2: MA04 Map Book.

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

### *Construction traffic routes, site haul routes and transfer nodes*

2.3.25 The movement of construction vehicles, whether to carry materials, plant, other equipment and workforce, or moving empty, would take place within the construction compounds, on public roads and between the compounds and working areas. Where reasonably practicable, movements between the construction compounds and the working areas would be on designated haul routes within the construction site, often along the line of the route of the Proposed Scheme or running parallel to it.

2.3.26 The construction compounds would provide the interface between the construction works and the public road or railway network. The likely road routes to access compounds in the Broomedge to Glazebrook area are described in the subsequent sections of this report.

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

2.3.28 Areas of land are also required for the storage, loading and unloading of bulk earthworks materials that are moved to and from the site on public roads. These would allow transfer of material between road vehicles and site vehicles during construction to balance traffic movements on the road network. These areas are referred to as transfer nodes and are shown on Map CT-05-322b to CT-05-326a in the Volume 2: MA04 Map Book.

## Construction compounds

2.3.29 This section provides a summary of the works to be managed from the construction compounds in the Broomedge to Glazebrook area, as illustrated in Figure 5 and Figure 6. All dates and durations of activities and number of workers are indicative. All compounds would undertake initial site set-up works and, at the end of its use,

finalisation works including site reinstatement, landscaping and planting (as necessary).

Figure 5: Construction compounds for civil engineering works

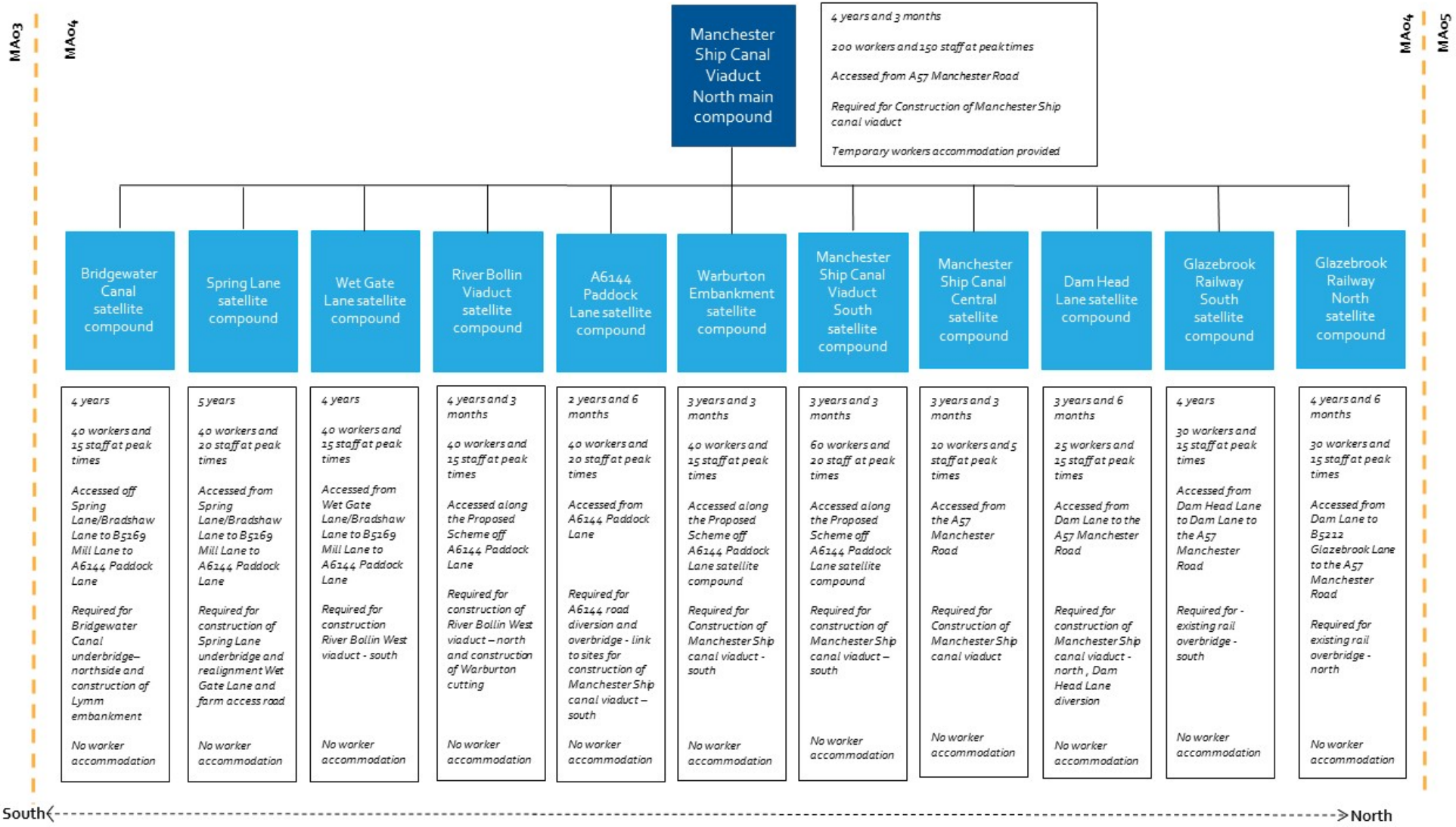
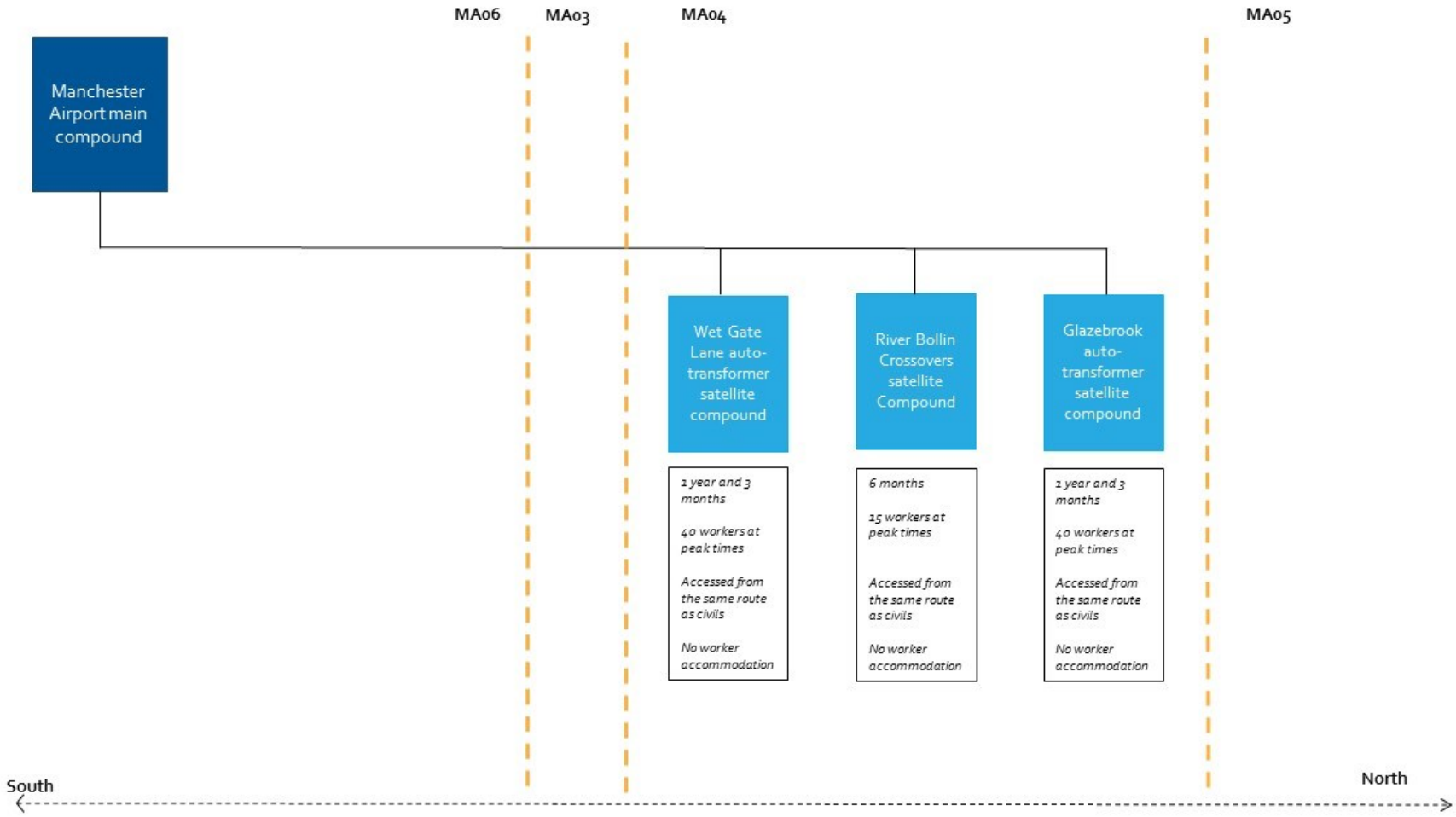


Figure 6: Construction compounds for railway systems works



### *Manchester Ship Canal Viaduct North main compound*

2.3.30 This main compound (see Volume 2: Map CT-05-325 F5 to I5) would be used to manage civil engineering works and provide main compound support to the 11 satellite civil engineering compounds in the Broomedge to Glazebrook area, as illustrated in Figure 5.

2.3.31 The works to be managed from this compound would require demolition of the following buildings and structures, as described in Table 1.

Table 1: Demolitions to be managed from the Manchester Ship Canal Viaduct North main compound

| Description | Location | Feature resulting in the demolition |
|---|---|---|
| **Residential** | | |
| Residential property and outbuildings | Heatley Heath Farm, Wet Gate Lane, Heatley | Lymm embankment |
| Three residential properties on Wet Gate Lane | Wet Gate Lane, Heatley | Lymm embankment |
| Residential property | Rose Cottage, Dam Head Lane, Rixton-with-Glazebrook | Glazebrook embankment |

2.3.32 The compound would be used to manage the construction of the Manchester Ship Canal viaduct which would take three years and three months to complete.

2.3.33 The compound would also be used to manage the construction of the Glazebrook embankment, which would take two years to complete.

2.3.34 A pre-cast yard to manufacture and pre-cast laydown area to store concrete elements, such as viaduct beams, and to facilitate the construction of the Manchester Ship Canal viaduct (Volume 2: Map CT-05-325 F5 and F6 to I5 and I6).

2.3.35 A temporary batching plant would be located within the compound which would provide concrete to the construction works across the Proposed Scheme.

2.3.36 Works to a number of public roads would be managed from this compound and are subject to ongoing design development and identification of alternative routes. It is currently expected that alternative temporary routes would be required on the following public roads:

- A57 Manchester Road;
- Manchester Road; and
- Glazebrook Lane.

2.3.37 Works to Rixton-with-Glazebrook Footpath 9 and accommodation access would be managed from this compound, and are subject to ongoing design development and identification of alternative routes. It is currently expected that alternative temporary routes would be required.

2.3.38 The works to be managed from this compound would require works to Hollins Green Brook.

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

### *A56 Lymm Road satellite compound*

2.3.40 The A56 Lymm Road satellite compound would be located mainly in the within the Pickmere to Agden and Hulseheath area (MA03) (see Volume 2: Map CT-05-322b G7) to the north of the A56 Lymm Road. A small section of this compound is present in the Broomedge to Glazebrook area (see Volume 2: Map CT-05-322b G6 and G7). It is described in the Volume 2: Community area report MA03 Pickmere to Agden and Hulseheath.

### *Bridgewater Canal satellite compound*

2.3.41 This compound (see Volume 2: Map CT-05-322b I5) would be used to manage civil engineering works in the Broomedge to Glazebrook area, as illustrated in Figure 5.

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

2.3.43 The compound would be used to manage the construction of the Lymm embankment, which would take two years to complete (Volume 2: Map CT-05-322b D5 to 323 F7).

2.3.44 The compound would also be used to manage the construction of the Bridgewater Canal underbridge, which would take one year and nine months to complete (Volume 2: Map CT-05-322b I5).

2.3.45 Works to a number of PRoW would be managed from this compound, and are subject to ongoing design development and identification of alternative routes. It is currently expected that alternative temporary routes would be required on the following PRoW:

- Agden Footpath 9/2 and accommodation access; and
- Cheshire Ring Canal Walk/Lymm Footpath 43.

2.3.46 The works to Agden Lane culvert to take unnamed watercourse under the route of the Proposed Scheme would be managed from this compound.

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

### *Spring Lane satellite compound*

2.3.48 This compound (see Volume 2: Map CT-05- 323 B7) would be used to manage civil engineering works in the Broomedge to Glazebrook area, as illustrated in Figure 5.

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

2.3.50 The compound would be used to manage the construction of the Lymm embankment, which would take two years to complete (Volume 2: Map CT-05-322b D5 to 323 F7).

2.3.51 This compound would also be used to manage the construction of the Spring Lane underbridge, which would take two years to complete (Volume 2: Map CT-05-323 C7).

2.3.52 The compound would also be used to manage the construction of the realignment of Wet Gate Lane which would take two years and six months.

2.3.53 Works to a number of public and private roads would be managed from this compound, and are subject to ongoing design development and identification of alternative routes. It is currently expected that alternative temporary routes would be required on the following public and private roads:

- Spring Lane;
- Little Heatley accommodation access; and
- Wet Gate Lane realignment.

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

### *Wet Gate Lane auto-transformer station satellite compound*

2.3.55 This compound (see Volume 2: Map CT-05- 323 D7) would be used to manage railway systems works in the Broomedge to Glazebrook area, as illustrated in Figure 6.

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

2.3.57 Key railway systems works to be managed from this compound would include construction and installation of the Wet Gate Lane auto-transformer station located on the west side of the Lymm embankment. After completion of the River Bollin West viaduct, the auto-transformer station would be built adjacent to the compound. Installation works would take one year and three months to complete.

2.3.58 Construction works for the Wet Gate Lane auto-transformer station would be accessed from the same route as the Wet Gate Lane satellite civil engineering compound (Bradshaw Lane/Spring Lane, Wet Gate Lane and then a site haul route parallel to the route of the Proposed Scheme).

### *Wet Gate Lane satellite compound*

2.3.59 This compound (see Volume 2: Map CT-05- 323 F7) would be used to manage civil engineering in the Broomedge to Glazebrook area, as illustrated in Figure 5.

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

2.3.61 The compound would be used to manage the construction of the Lymm embankment, which would take two years to complete (Volume 2: Map CT-05-322b D5 to 323 F7).

2.3.62 The compound would be used to manage the construction of the River Bollin West viaduct, which would take one year to construct.

2.3.63 The compound would also be used to manage the construction of the earthworks and foundations for the Wet Gate Lane auto-transformer station which would take one year and three months to complete (Volume 2 Map CT-05-323 F7).

2.3.64 Works to a number of PRoW would be managed from this compound, and are subject to ongoing design development and identification of alternative routes. It is currently expected that alternative temporary routes would be required on the following PRoW:

- Trans Pennine Trail (National Cycle Route 62);
- Dunham Footpath 8;
- Lymm Footpath 37; and
- Warburton Footpath 4.

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

### *River Bollin West viaduct satellite compound*

2.3.66 This compound (Volume 2: Map CT-05- 323 H8) would be used to manage civil engineering works in the Broomedge to Glazebrook area, as illustrated in Figure 5.

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

2.3.68 The compound would be used to manage the construction of the River Bollin West viaduct would take one year to complete.

2.3.69 The compound would also be used to manage the construction of the Warburton cutting would take one year and nine months to complete and the Heatley embankment would take one year six month to complete. (Volume 2 Map CT-05-323 H8).

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

- a temporary bridge would be required over the River Bollin for construction access;
- the River Bollin would also require local diversions to support construction of the River Bollin West viaduct; and
- to the north of the viaduct Fox Covert watercourse would be diverted via a culvert which would be constructed prior to the Heatley embankment.

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

### *River Bollin crossovers satellite compound*

2.3.72 This compound (see Volume 2: Map CT-05- 323 I7) would be used to manage railway systems works in the Broomedge to Glazebrook area, as illustrated in Figure 6.

2.3.73 Key railway systems work would be undertaken from the River Bollin crossovers satellite compound and managed from the Manchester Airport main compound in the Hulseheath to Manchester Airport area (MA06). These works would include construction and installation of the River Bollin crossovers. The River Bollin crossovers satellite compound would be accessed from the same route as the A6144 Paddock Lane satellite compound that would be used for major civils works in this area

(Paddock Lane and then a site haul route parallel to the route of the Proposed Scheme).

### *A6144 Paddock Lane satellite compound*

2.3.74 This compound (see Volume 2: Map CT-05- 324 E8) would be used to manage civil engineering works in the Broomedge to Glazebrook area, as illustrated in Figure 5.

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

2.3.76 This compound would manage civil engineering works associated with the realignment of A6144 Paddock Lane and the construction of the A6144 Paddock Lane overbridge and realignment, which would take two years and six months (Volume 2: Map CT-05- 324 E7).

2.3.77 The compound would also be used to manage the construction of the Warburton embankment, which would take one year and three months to complete (Volume 2: Map CT-05- 324 G7 to H7).

2.3.78 On completion of the realignment of the A6144 Paddock Lane, traffic management measures would be implemented for three months to enable connection between the realigned road and the existing road.

2.3.79 Works to a number of PRoW would be managed from this compound, and are subject to ongoing design development and identification of alternative routes. It is currently expected that alternative temporary routes would be required on the following PRoW:

- Warburton Footpath 3; and
- Moss Brow Farm accommodation access.

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

- A6144 Paddock Lane culvert to convey an unnamed watercourse under the under the realigned A6144 Paddock Lane; and
- Warburton culvert to convey an unnamed watercourse/dry valley to the north of the diverted A6144 Paddock Lane overbridge to take the watercourse under the Warburton embankment.

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

### *Warburton embankment satellite compound*

2.3.82 This compound (see Volume 2: Map CT-05- 324 H7) would be used to manage civil engineering works in the Broomedge to Glazebrook area, as illustrated in Figure 5.

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

2.3.84 This compound would manage civil engineering works associated with construction of the southern end of the Manchester Ship Canal viaduct which would take three years and three months.

2.3.85 The works to be managed from this compound would require the diversion of Warburton Footpath 11. During construction users would be diverted along alternative routes for a period of two years and six months.

2.3.86 The works to be managed from this compound would require protection works to Warburton Park Brook.

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

### *Manchester Ship Canal Viaduct South satellite compound*

2.3.88 This compound (Volume 2: Map CT-05- 324 I7 to 325 C5) would be used to manage civil engineering works in the Broomedge to Glazebrook area, as illustrated in Figure 5.

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

2.3.90 This compound would manage civil engineering works associated with construction of the southern end of the Manchester Ship Canal viaduct which would take three years and three months.

2.3.91 Works to a number of PRoW and accommodation access would be managed from this compound, and are subject to ongoing design development and identification of alternative routes. It is currently expected that alternative temporary routes would be required on the following PRoW and accommodation access:

- accommodation access to the east of Warburton Park; and
- Partington Footpath BW2/BW6 part of the Manchester Ship Canal towpath, including a section of the Bollin Valley Way.

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

### *Manchester Ship Canal Viaduct Central satellite compound*

2.3.93 This compound (see Volume 2: Map CT-05- 325 D3 to E7) would be used to manage civil engineering works in the Broomedge to Glazebrook area, as illustrated in Figure 5.

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

2.3.95 This compound would initially manage the provision of the A57 Manchester Road which would take one year and six months.

2.3.96 The compound would subsequently manage the construction of the central section of the Manchester Ship Canal viaduct (south of the A57 Manchester Road) which would take three years and three months.

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

### *Dam Head Lane satellite compound*

2.3.98 This compound (see Volume 2: Map CT-05- 325 H4 and I4) would be used to manage civil engineering works in the Broomedge to Glazebrook area, as illustrated in Figure 5.

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

2.3.100 This compound would manage the construction of the Glazebrook embankment which would take two years.

2.3.101 The works to be managed from this compound would require Dam Head Lane diversion which would take one year and six months.

2.3.102 Works to Rixton-with-Glazebrook Footpath 8 would be managed from this compound, and is subject to ongoing design development and identification of alternative routes. It is currently expected that alternative temporary routes would be required.

2.3.103 The works to be managed from this compound would require the diversion of Hollins Green Brook to go under the diverted Dam Head Lane in a culvert.

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

### *Glazebrook Railway South satellite compound and Glazebrook auto-transformer station satellite compound*

2.3.105 This compound (see Volume 2: Map CT-05- 326 C3) would be used to manage both civil engineering and railway systems works in the Broomedge to Glazebrook area, as illustrated in Figure 5 and Figure 6.

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

2.3.107 This compound would manage the construction of the Glazebrook (Railway) underbridge to carry the route of the Proposed Scheme over the existing Liverpool to Manchester (via Warrington Central) railway line. Construction of the Glazebrook (Railway) underbridge would take two years and nine months to complete. The compound would be located to the south of the Liverpool to Manchester (via Warrington Central) railway line.

2.3.108 The works to be managed from this compound would require the closure of current Dam Head Lane south of the Liverpool to Manchester (via Warrington Central) railway line which would then be diverted along the Dam Head Lane diversion.

2.3.109 The works to be managed from this compound would require permanent realignment of Rixton-with-Glazebrook Footpath 14 via Glazebrook (Railway) underbridge. During construction of the realignment users would be diverted along alternative routes for a period of two years and nine months.

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

2.3.111 Key railway systems works to be managed from this compound would include construction and installation of the Glazebrook auto-transformer station located 50m north of Dam Head Lane. The installation of the Glazebrook auto-transformer station railway systems equipment would also take one year three months to complete. Construction works for the Glazebrook auto-transformer station would be accessed from the same route as the Glazebrook Railway South satellite compound for the major civils works.

### *Glazebrook Railway North satellite compound*

2.3.112 This compound (see Volume 2: Map CT-05- 326 D4) would be used to manage civil engineering works in the Broomedge to Glazebrook area, as illustrated in Figure 5.

2.3.113 The construction of this underbridge over the live railway would require some track possessions. The timing and duration of these possessions is yet to be confirmed.

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

2.3.115 This compound would manage the construction of the Glazebrook (Railway) underbridge to carry the route of the Proposed Scheme over the existing Liverpool to Manchester (via Warrington Central) railway line. Construction of the Glazebrook (Railway) underbridge would take two years and nine months to complete.

2.3.116 The works to be managed from this compound would require the closure of the existing Dam Head Lane north of the Liverpool to Manchester (via Warrington Central) railway line.

2.3.117 These works would allow farm access along the bottom of the embankment, on both east and west sides, to pass under the Glazebrook (Railway) underbridge, with a track on the north side of the existing Liverpool to Manchester (via Warrington Central) railway line. The new access road and railway underbridge would be completed, and users diverted before the existing track is permanently closed.

2.3.118 Works to watercourses that would be managed from this compound include the diversion of an unnamed watercourse under the Proposed Scheme via the Glazebrook Moss Culvert.

2.3.119 There would also be utilities works 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 (CDEW) that would be produced during construction of the Proposed Scheme are reported in Volume 3, Route-wide effects.

2.3.122 Local excess or shortfall of excavated material within the Broomedge to Glazebrook area would be managed through the mitigation earthworks design approach adopted for the Proposed Scheme, with the aim of contributing to an overall balance of excavated material on a route-wide basis. The overall balance of excavated material would be presented in Volume 3 of the formal ES.

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

## Commissioning of the railway

2.3.124 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

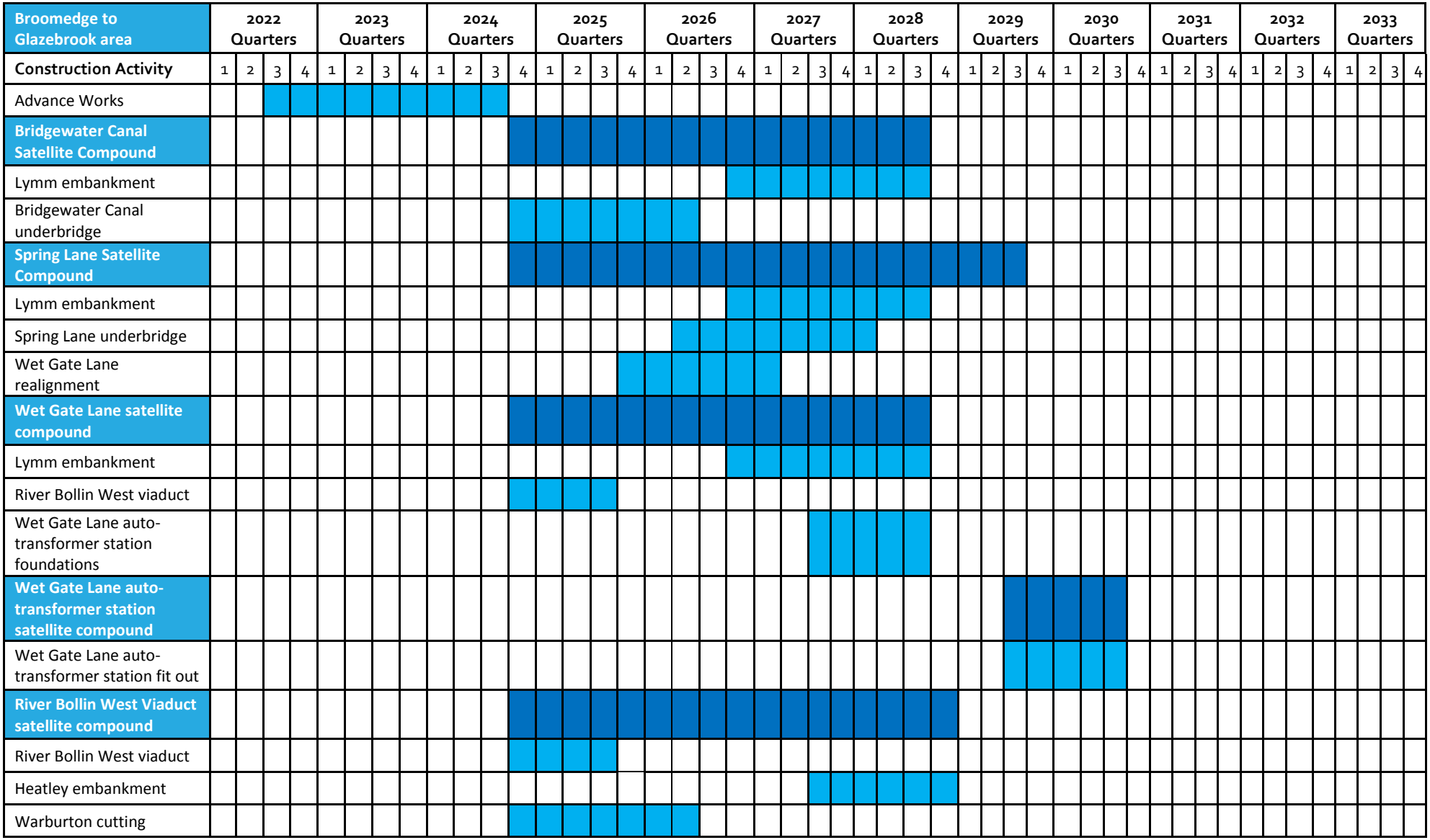
2.3.125 A construction programme illustrating indicative periods for each of the core construction activities described above is provided in Figure 7. Construction durations referred to in the following sections of this report are based on this indicative programme.

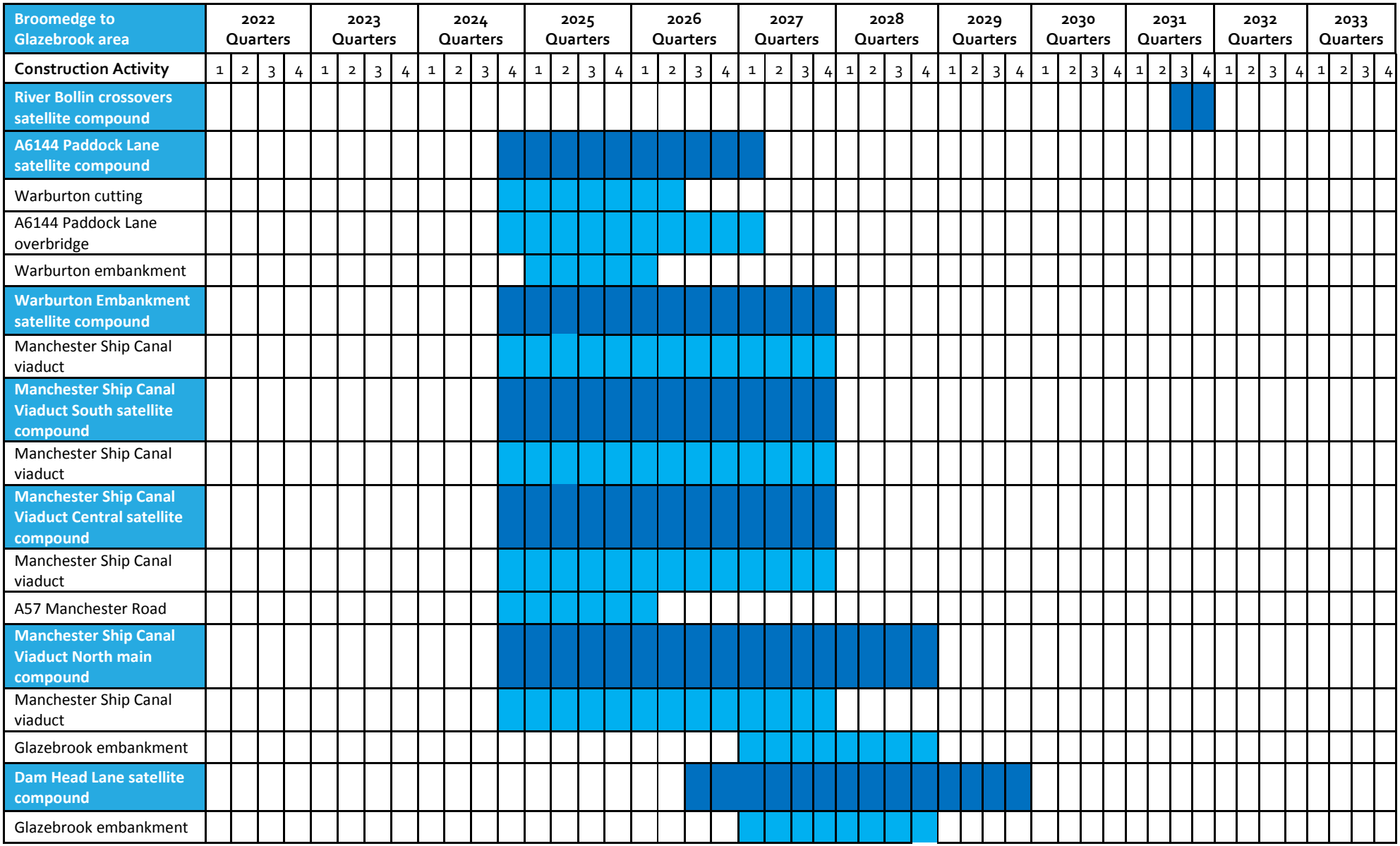
## Monitoring during construction

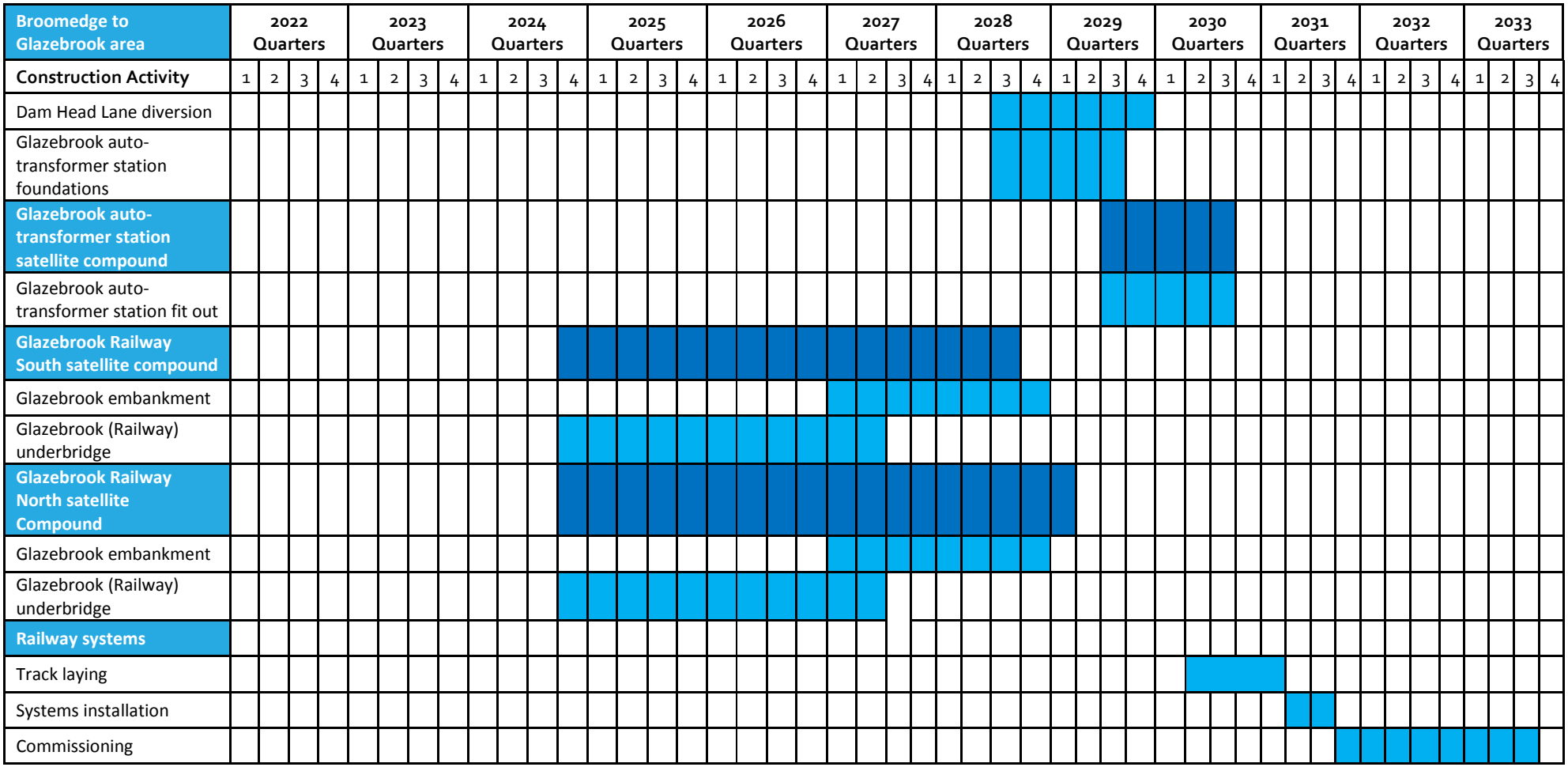
2.3.126 The appointed contractor would be required to undertake the necessary monitoring for each environmental topic to comply with the requirements of the CoCP, the relevant LEMP and any additional consent requirements. Any actions that may be necessary for compliance would be reported to the nominated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

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

Figure 7: Indicative construction programme between 2023 and 2033




Broomedge to Glazebrook area
2022 Quarters
2023 Quarters
2024 Quarters
2025 Quarters
2026 Quarters
2027 Quarters
2028 Quarters
2029 Quarters
2030 Quarters
2031 Quarters
2032 Quarters
2033 Quarters
Construction Activity
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 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
River Bollin crossovers satellite compound
A6144 Paddock Lane satellite compound
Warburton cutting
A6144 Paddock Lane overbridge
Warburton embankment
Warburton Embankment satellite compound
Manchester Ship Canal viaduct
Manchester Ship Canal Viaduct South satellite compound
Manchester Ship Canal viaduct
Manchester Ship Canal Viaduct Central satellite compound
Manchester Ship Canal viaduct
A57 Manchester Road
Manchester Ship Canal Viaduct North main compound
Manchester Ship Canal viaduct
Glazebrook embankment
Dam Head Lane satellite compound
Glazebrook embankment


Broomedge to Glazebrook area
2022 Quarters
2023 Quarters
2024 Quarters
2025 Quarters
2026 Quarters
2027 Quarters
2028 Quarters
2029 Quarters
2030 Quarters
2031 Quarters
2032 Quarters
2033 Quarters
Construction Activity
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 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
Dam Head Lane diversion
Glazebrook auto-transformer station foundations
Glazebrook auto-transformer station satellite compound
Glazebrook auto-transformer station fit out
Glazebrook Railway South satellite compound
Glazebrook embankment
Glazebrook (Railway) underbridge
Glazebrook Railway North satellite Compound
Glazebrook embankment
Glazebrook (Railway) underbridge
Railway systems
Track laying
Systems installation
Commissioning

## 2.4 Operation of the Proposed Scheme

### 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 three trains per hour each way passing through the Broomedge to Glazebrook area. Services are expected to operate between 05:00 and midnight from Monday to Saturday and 08:00 and midnight on Sunday.

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

### Maintenance

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

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

2.4.6 Provision for railway maintenance vehicles along the western leg of the route of the Proposed Scheme would be made at the Crewe North rolling stock depot (RSD) in the Wimboldsley to Lostock Gralam area (MA02). Further information on the Crewe North RSD can be found in Volume 2: Community area report MA02, Wimboldsley to Lostock Gralam.

### Operational waste and material resources

2.4.7 The assessment of the likely significant environmental effects associated with the disposal of operational waste would be undertaken for the Proposed Scheme as a whole and reported in Volume 3, Route-wide effects of the formal ES.

2.4.8 Forecasts of the amount of waste arising from track maintenance and ancillary infrastructure and the associated potential significant environmental effects would also be reported in the Final ES.

### Monitoring during operation

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

2.4.10 Relevant local authorities and consenting authorities, such as the Environment Agency, would be consulted on the monitoring procedures to be implemented prior to construction commencement.

## 2.5 Route section alternatives

### Manchester Ship Canal crossing – horizontal realignment

2.5.1 As part of the design development process since July 2017, consideration has been given to impacts on receptors at Hollins Green and on Hollinfare Cemetery.

2.5.2 The Proposed Scheme would pass on a 2km long viaduct (Manchester Ship Canal viaduct) up to 28m high across the Manchester Ship Canal. The viaduct would pass to the east of the settlement of Hollins Green and would be less than 5m from the boundary of Hollinfare Cemetery.

2.5.3 As part of the development of the design, further work is being undertaken to consider the horizontal alignment of the Proposed Scheme in this area with a view to moving the route further east away from Hollins Green.

2.5.4 Further studies will be carried out to consider the alignment of the route to be included in the Proposed Scheme and the outcome of these studies will be reported in the formal ES.

# 3 Stakeholder engagement and consultation

## 3.1 Introduction

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

3.1.2 Since the initial preferred route announcement in November 2016, HS2 Ltd has carried out a programme of informal stakeholder engagement and formal consultation with a broad range of stakeholders.

3.1.3 A variety of mechanisms have been used to enable an open and inclusive approach to engagement and consultation, reflecting the differing requirements and expectations of stakeholders.

3.1.4 Whilst stakeholders have informed the design and assessment of the Proposed Scheme to-date, it is important to note that this is an ongoing process. Feedback from the consultation on the working draft ES and emerging scheme design and ongoing engagement will continue to be considered as part of the ongoing design and assessment of the Proposed Scheme ultimately presented in the formal ES. There will be further consultation undertaken on the formal ES by Parliament following deposit of the hybrid Bill.

## 3.2 Key stages of Phase 2b engagement and consultation

3.2.1 The process of engagement remains ongoing. A summary of engagement undertaken or underway since the initial preferred route announcement in November 2016, is provided in Table 2.

Table 2: Mechanisms and timeline of stakeholder engagement since route announcement

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

### Draft EIA SMR consultation

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

### Consultation on the working draft ES and ongoing engagement

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

3.2.4 These consultations and wider feedback from ongoing stakeholder engagement will continue to be considered as part of the ongoing design of the Proposed Scheme and the assessment and identification of mitigation opportunities for the Broomedge to Glazebrook area. A consultation summary report will be published with the formal ES explaining how the responses have been taken into consideration.

## 3.3 Informing the Proposed Scheme

3.3.1 The main purpose of stakeholder engagement and consultation at this early stage is to inform the Proposed Scheme. Volume 1 details the engagement and consultation undertaken prior to initial preferred route announcement in November 2016.

3.3.2 The main themes to emerge from stakeholder engagement in the Broomedge to Glazebrook area since the initial preferred route announcement in November 2016, and which are informing the Proposed Scheme are:

- temporary and permanent land requirements during construction and operation;
- impact of construction traffic on local highways in and around Hollins Green, particularly Dam Lane, as well as temporary and permanent highway diversions;
- proximity of the Proposed Scheme to Hollinfare Cemetery and impact on its setting and tranquillity;
- noise, visual and landscape issues due to the proximity and height of the Proposed Scheme approaching and crossing the Manchester Ship Canal; and
- impact on local businesses, including the Black Swan public house at Hollins Green.

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

## 3.4 Engagement and consultation with stakeholder groups

### Communities

3.4.1 Community stakeholders in the Broomedge to Glazebrook area include a range of local interest groups, local facility and service providers, places of worship, schools and educational establishments, cultural, leisure and sports stakeholders, cultural, leisure and sports stakeholders.

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

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

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

3.4.5 Table 3 summarises key engagement undertaken with community stakeholders to date, including the focus of the engagement and how this has informed the design of the Proposed Scheme.

Table 3: Engagement to date with community stakeholders

| Stakeholder | Area of focus |
|---|---|
| Rixton and Glazebrook Action Group and Glazebrook Action Group | Engagement over the proximity of the route to Hollinfare Cemetery and the impact to it and its setting and tranquillity. Concern also regarding the impact of construction traffic, and wider local transport facilities. Discussion also over recent A57 highways improvements |
| Scouts of Croft and Hollins Green | Meeting to discuss opportunities for younger people and the proximity of the route to local communities. |
| Woolston Learning Village | Meeting and discussions with three special needs schools covering the Warrington Area (Green Lane, Woolston Brook and Fox Wood). Concerns regarding the impact of construction traffic and highway realignments that might affect travel routes to and from the schools. |

## Local authorities and parish councils

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

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

3.4.9 Key issues identified during engagement with local authorities and parish councils include those summarised in Table 4.

Table 4: Engagement to date with local authorities and parish councils

| Stakeholder | Area of focus |
|---|---|
| Warrington Borough Council | General introductory and project update meetings including discussion regarding the Proposed Scheme to Golborne and alternative proposals as presented by Warrington Borough Council. Confirmation of the services that Warrington would receive and how HS2 can support wider regeneration within the area. |
| Rixton-with-Glazebrook Parish Council-with-Glazebrook Parish Council | General introductory and project update meetings including discussion regarding the proximity and height of the Proposed Scheme in relation to local communities and residential properties, the impact on Hollinfare Cemetery its current tranquil setting, construction traffic and associated wider impact on local transport facilities. |

3.4.10 Councils will continue to be engaged as part of the design development of the Proposed Scheme with ongoing dialogue on key topics such as highways, PRoW and the draft Code of Construction Practice (CoCP)[21].

## Expert, technical and specialist groups

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

- Animal and Plant Health Agency;
- British Geological Survey;
- Campaign to Protect Rural England;
- Canal & River Trust;
- Coal Authority;

[21] Supporting document: Draft Code of Construction Practice

- Department of Environment, Food and Rural Affairs;
- Environment Agency;
- Fera Science Ltd;
- Forestry Commission;
- Highways England;
- Historic England;
- Inland Waterways Association;
- National Farmers Union;
- National Trust;
- Natural England;
- Network Rail;
- Peel Ports;
- Public Health England;
- Ramblers Association;
- Royal Agricultural Society;
- Royal Society for the Protection of Birds;
- Royal Society of Wildlife Trusts/The Wildlife Trusts; and
- Woodland Trust.

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

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

### Utilities

3.4.14 Engagement is also ongoing with utility companies and statutory stakeholders such as National Grid Transmission (Gas), United Utilities, SP Energy Networks, ESSAR, BT Openreach, Virgin Media, Vodafone Ltd (Below Ground Assets), Vodafone and O2 Mobile Masts, EE and 3 Mobile Masts, Cadent Gas, Level 3 and Electricity North West to establish what infrastructure exists in the Broomedge to Glazebrook area and how it may need to be modified as part of the Proposed Scheme.

### Directly affected individuals, major asset owners and businesses

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

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

3.4.17 Information gathered from 11 farm visits have informed the assessment presented in this working draft ES. Farm visits are ongoing and engagement will continue as the design and assessment develops.

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

3.4.19 A route-wide programme of engagement is ongoing, in parallel to the working draft ES process. This engagement provides affected individuals, major asset owners and businesses the opportunity to raise issues and opportunities in relation to the Proposed Scheme and to gain an understanding of compensation and assistance available for property owners. Within the Broomedge to Glazebrook area, an information event was held at Rixton-with Glazebrook Community Hall on 29 June 2018. Facilities were available at the event for affected individuals, major asset owners and businesses to have private meetings with HS2 staff.

3.4.20 Engagement has been undertaken with NC Developments, Peel Ports and Lymm Marina.

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

# 4 Agriculture, forestry and soils

## 4.1 Introduction

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

4.1.2 Engagement with farmers and landowners has commenced and is ongoing. The purpose of the engagement has been to obtain baseline information on the scale and nature of the farm and forestry operations and related farm-based uses, and to provide farmers and landowners with the opportunity to raise issues and discuss mitigation in relation to the Proposed Scheme. Engagement undertaken with farmers and landowners will be documented in a farm pack for each farm holding within a Phase 2b Farmers and Growers Guide[22].

4.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme are provided in the Volume 2: MA04 Map Book.

## 4.2 Scope, assumptions and limitations

4.2.1 The assessment scope, key assumptions and limitations for the agriculture, forestry and soils assessment are set out in Volume 1 (Section 8) and the Scope and Methodology Report (SMR) [23].

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

4.2.3 The quality of agricultural land in England and Wales is assessed according to the Agricultural Land Classification (ALC)[24] 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

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

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

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

4.2.5 The primary functions provided by soils other than for food and biomass production, such as flood water attenuation, carbon storage or the support of ecological habitats, are identified in this section and the ability of the soils to fulfil their primary functions after construction of the Proposed Scheme is assessed. Soil attributes, other than for food and biomass production, are identified in this section, but the resulting function or service provided is assessed in other sections, notably Section 7, Ecology and biodiversity; Section 9, Historic environment; Section 11, Landscape and visual; and Section 15, Water resources and flood risk.

4.2.6 The main issue for farm holdings is disruption by the Proposed Scheme of the physical structure of agricultural holdings and the operations taking place upon them, during both construction and operational phases. Where any part of a farm or rural holding is required for the construction and operation of the Proposed Scheme, the whole land holding is part of the study area for impacts on this receptor.

4.2.7 Common assumptions that have been used in assessing the effects of the Proposed Scheme are set out in Volume 1 (Section 8). These assumptions include the restoration of agricultural land that is required temporarily for construction to agricultural use, and the handing back of land used temporarily to the original landowner. It is also assumed that buildings and other farm infrastructure on the land holding will not be replaced as this would ultimately be at the discretion of the landowner. For this reason, financial compensation is not a consideration in the assessment of effects on farm holdings, as set out under Impacts on holdings below. In the majority of cases, the details of land use have been obtained from face-to-face interviews. Where this has not been possible, holding data has been obtained from publicly available sources.

## 4.3 Environmental baseline

### Existing baseline

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

## Soil and land resources

### *Geology and soil parent materials*

4.3.2 A full description of the geological characteristics of the Broomedge to Glazebrook area is provided in Section 10, Land quality and Section 15, Water resources and flood risk.

4.3.3 The study area is covered by various superficial deposits. Alluvium variably comprising silty clay, silt, sand and gravel occur along the courses of streams and rivers. Alluvium is present in the area associated with the River Bollin around Heatley and the former route of the River Mersey, which is part canalised as it flows into the Manchester Ship Canal around Hollins Green.

4.3.4 Areas of glaciofluvial sheet deposits, comprising sand and gravel, are present intermittently along the route of the Proposed Scheme in the area around Heatley and Hollins Green.

4.3.5 Glacial till[25] (Devensian) deposits are located from the start of the area (Agden Park Lane) to south of Lymm Road.

4.3.6 The Shirdley Hill Sand Formation, comprising sand, is present between the A56 Lymm Road and Spring Lane and in the Warburton area, between Moss Brow Farm and Coroners Wood.

4.3.7 An area of peat is located around Glazebrook Moss at the northern end of the area.

4.3.8 The predominant type of bedrock underlying the study area belongs to the Northwich Halite Member (part of the Mercia Mudstone Group), comprising halite stone and mudstone. It occurs around Lymm and Heatley, from the A56 Lymm Road to the River Bollin.

4.3.9 Mudstone of The Bollin Mudstone Member (part of the Mercia Mudstone Group) is present around Heatley and Warburton.

4.3.10 The Tarporley Siltstone Formation (part of the Mercia Mudstone Group), which comprises siltstone, is present around Hollins Green and Glazebrook.

4.3.11 The northern end of the study area is underlain by sandstone in the Helsby Sandstone Formation (part of the Sherwood Sandstone Group).

### *Topography and drainage*

4.3.12 In the south of the study area, the land dips over a gentle slope (approximately two degrees) from the Bridgwater Canal, at an elevation of 28m above Ordnance Datum (AOD), to the River Bollin at 16m AOD. To the north of the river, there is a gentle incline (approximately two degrees) to higher ground at Warburton Lane at 21m AOD. From Warburton Lane, the land along the route of the Proposed Scheme is broadly level at 20m AOD until Warburton Park, where the land dips gently (approximately two degrees) to the Manchester Ship Canal at 16m AOD. To the north of the canal,

[25] Glacial till is sometimes described as 'diamicton' in the BGS lexicon. This term relates to sediment deposited from land-based erosion (such as from landslides and debris flows). In this case the term 'glacial till' refers to diamicton of glacial origin.

the land rises up a gentle slope (approximately two degrees) to higher ground at the A57 Manchester Road at 21m AOD. The land over the remainder of the study area gently rises and falls between elevations of 21-23m AOD.

4.3.13 Land at risk of flooding by rivers occurs in this study area. There are substantial areas of floodplain in Flood Zone 2, in which there is between a 1 in 100 and 1 in 1,000 annual probability of river flooding, and Flood Zone 3, in which there is a 1 in 100 or greater annual probability of river flooding. The flood zones are associated with the River Bollin and River Mersey/Manchester Ship Canal. Other floodplains within the study area include those associated with Red Brook and Warburton Park Brook. Further details are provided in Section 15, Water resources and flood risk.

### *Description and distribution of soil types*

4.3.14 The broad characteristics of the soils likely to be present in the study area are described by the Soil Survey of England and Wales[26] and their general distribution is shown on the National Soil Map[27]. Soils possessing similar characteristics are amalgamated into associations.

4.3.15 There are five known groups of soil associations in this study area. The presence of each group has been confirmed in part of the study area by published soil survey data. Soils grouped in the Blackwood association are predominant in the south, centre and north of the study area. This group comprises deep, permeable sandy and sandy loam soils. They are developed in glacial river deposits which are variable in stone content and frequently overlie clay deposited in glacial lakes, or glacial till, at depth. Where undrained, the Blackwood soils are waterlogged for long periods during the winter (Wetness Class[28] (WC) III and WC IV). These soils experience fluctuating levels of groundwater, but where the water-table has been lowered, the soils are well drained (WC I) or only slightly seasonally waterlogged (WC II).

4.3.16 To the south of the Manchester Ship Canal, soils grouped in the Crannymoor association are developed in glaciofluvial sands and gravels. This group consists mainly of very acidic and well drained (WC I) sandy soils. These soils are slightly to moderately droughty for most arable crops and very droughty for grass.

4.3.17 Soils grouped in the Salop association occur in the north of the study area near Glazebrook. This association comprises slowly permeable and seasonally waterlogged clay loams over clay soils (WC III to IV). They are developed in reddish glacial deposits, i.e. till and glaciofluvial sand and gravel deposits.

4.3.18 Between Glazebrook and the M62, there is an area of peat in which deep, earthy peat soils of the Turbary Moor association are formed. If these soils are improved for arable crops, usually with the use of pumped ditches combined with field drains, they are well drained (WC I). Wetness class will vary depending on the level of the water-table

[26] 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
[27] Cranfield University (2001), *The National Soil Map of England and Wales 1:250,000 scale.* Cranfield University: National Soil Resources Institute
[28] The Wetness Class of a soil is classified according to the depth and duration of waterlogging in the soil profile and has six categories from WC I which is well drained to WC VI which is very poorly drained

and duration of waterlogging during the winter months. These peat soils hold large amounts of water available for crops.

4.3.19 There are some deep, stoneless, fine silty soils in the Conway association developed in alluvium in the floodplains of the River Bollin and the River Mersey/Manchester Ship Canal. These soils are usually greyish brown or grey and are affected by high groundwater. They are waterlogged for long periods during the winter (WC IV).

## Soil and land use interactions

### *Agricultural land quality*

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

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

4.3.22 Climate within this area does not in itself place any limitation on agricultural land quality. However, the interactions of climate with soil characteristics are important in determining the wetness and droughtiness[29] limitations of the land.

4.3.23 The local agro-climatic data have been interpolated from the Meteorological Office's standard 5km grid point dataset[30] for three points within the study area. The data show climate in the area to be cool and moist. The number of Field Capacity Days[31] (FCDs), when the moisture deficit[32] is zero, ranges from 197 to 205 days per annum. This is higher than average for lowland England (150 days) and generally constrains agricultural cultivations and soil handling for relatively long periods over winter. Moisture deficits, which give an indication of the liability of soils to droughtiness in summer, are moderately small.

4.3.24 The quality of agricultural land in this study area is not limited by gradient, i.e. the angle of slope is less than seven degrees, or microrelief[33]. Flood risk limits the quality of agricultural land to Subgrade 3b or Grade 4 in the floodplain of the River Bollin and the River Mersey/Manchester Ship Canal. Further details are provided in Section 15, Water resources and flood risk.

4.3.25 The main physical limitations that result from interactions between soil, climate and site factors are soil wetness and soil droughtiness. For soil wetness, each soil can be allocated a Wetness Class based on soil structure, evidence of waterlogging and the number of FCDs. The topsoil texture then determines its ALC grade. Soil droughtiness

[29] 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
[30] Meteorological Office (1989), *Gridpoint Meteorological data for Agricultural Land Classification of England and Wales and other Climatological Investigations*.
[31] Field Capacity Days (FCD) is a meteorological parameter which estimates the duration of the period when the soil moisture deficit is zero. Soils usually return to field capacity (zero deficit) during the autumn or early winter and the field capacity period, measured in days, ends in the spring when evapotranspiration exceeds rainfall and a moisture deficit begins to accumulate.
[32] The moisture deficit is a crop-related meteorological variable which represents the balance between rainfall and potential evapotranspiration calculated over a critical portion of the growing season
[33] Microrelief is the complex change of slope angle and direction over short distances, or the presence of boulders or rock outcrops, which can severely limit the use of agricultural machinery

is determined by the moisture retention of different soil textures and thicknesses of each soil horizon, soil structures, stone content and moisture deficits.

4.3.26 Sandy soil profiles in the Blackwood association which are predominant in this study area are affected by a high water-table (WC III-IV), the quality of agricultural land is limited by soil wetness to Subgrade 3a where the profile is seasonally waterlogged (WC III), or Subgrade 3b where the profile is waterlogged for long periods during the winter (WC IV).

4.3.27 The very acidic and well drained (WC I) sandy soils in the Crannymoor association are inherently infertile, and they are particularly deficient in potassium, i.e. a major plant nutrient. Good yields of crops can be achieved with the use of fertilizer and irrigation in early summer. The quality of agricultural land is limited mainly by soil droughtiness to Grade 2 or Subgrade 3a.

4.3.28 The clay loam over clay soils in the Salop association are slowly permeable and seasonally waterlogged for long periods during the winter (WC IV). In a climate area with between 197 to 205 field capacity days, soil profiles with heavy clay loam topsoil are limited by soil wetness to Grade 4. Where the topsoil is medium clay loam, the soil profiles are limited to Subgrade 3b. Salop soil profiles in WC III are limited by soil wetness to Subgrade 3b where the topsoil is heavy clay loam, and to Subgrade 3a where the topsoil is medium clay loam.

4.3.29 Deep earthy peat soil of the Turbary Moor association (WC I) is classified as Grade 1 where the topsoil is peat, or Grade 2 where the topsoil is organic medium clay loam. The peaty soils are limited by soil wetness to Grade 2 (WC III), or Subgrade 3a (WC IV).

4.3.30 The deep, stoneless, fine silty soils in the Conway association are waterlogged for long periods over the inter (WC IV). They are developed in alluvium close to rivers and agricultural land quality is mainly limited by sol wetness to Subgrade 3b and Grade 4. The quality of this agricultural land is also limited by a risk of flooding in parts.

4.3.31 As set out in the SMR, the sensitivity of BMV land in the study area is determined relative to the abundance of such land in the area, set as a 4km corridor centred on the route of the Proposed Scheme. Department for Environment, Food and Rural Affairs (Defra) predictive mapping[34] shows that there is a high likelihood of encountering BMV agricultural land in the locality, which makes such land a resource of low sensitivity in this study area.

4.3.32 The preceding assessment of agricultural land quality attributed to the soil associations is based on interpretation of publicly available data and will be confirmed by detailed soil survey, as will be the detailed distribution of soil types and land in the various grades of the ALC. The results will be reported in the formal Environmental Statement (ES).

[34] Defra (2005), *Likelihood of Best and Most Versatile Agricultural Land*

### *Other soil interactions*

4.3.33 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[35] and the Government's White Paper, The Natural Choice: securing the value of nature[36], and include:

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

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

4.3.35 Within the study area, the floodplains of the River Bollin and the River Mersey/Manchester Ship Canal occupy land where water has to flow or be stored in times of flood, as set out in Section 15, Water resources and flood risk. The soils and floodplains in this study area function as water stores for flood attenuation, as well as providing ecological habitat.

## Land use

### *Land use description*

4.3.36 Agricultural land use in this study area is predominantly arable, although some grassland with beef cattle is present. Around Glazebrook, some smaller equestrian holdings are also to be found.

4.3.37 Woodland is sparse and limited to small parcels of tree planting across the study area. No commercial forestry has thus far been identified in this study area. As described in Section 7, Ecology and biodiversity, part of an ancient semi-natural woodland is located partially within land required for the Proposed Scheme, i.e. Coroners Wood, near Hollins Green to the south of Glazebrook.

4.3.38 A number of environmental designations influence land use within the study area. From the River Mersey/Manchester Ship Canal to Holcroft Moss, agricultural land in the study area falls within a nitrate vulnerable zone for surface water (2017). In this

[35] Defra (2009), *Soil Strategy for England*
[36] HM Government (2011), *The Natural Choice: securing the value of nature*

part of the study area, statutory land management measures apply limiting the average amount of nitrogen from manufactured fertiliser and organic manures that can be applied to agricultural land. This is to reduce nitrogen losses from agricultural sources to the natural water environment.

4.3.39 Some agricultural land is also subject to agri-environment management prescriptions that seek to retain and enhance the landscape and biodiversity qualities and features of farmland. These are associated with the Environmental Stewardship Scheme (the Entry Level Scheme (ELS) or Higher Level Scheme (HLS)), or the Countryside Stewardship Scheme (CSS), which has been the main agri-environment scheme in England since 2015. The CSS incorporates elements of Environmental Stewardship, the England Woodland Grant scheme and Catchment Sensitive Farming grants.

4.3.40 Most Environmental Stewardship agreements, which were extensive and covered approximately 70% of agricultural land in England, have now ended although existing agreements will run their course. The higher tier and mid-tier options in the CSS are more focused than Environmental Stewardship, with applications for funding being competitive and the area covered by the scheme less than that covered under Environmental Stewardship. However, four new simpler non-competitive offers have been introduced in 2018 to complement the higher tier and mid-tier options and open up the scheme to more farmers and land managers. Holdings that have land entered into an agri-environment scheme are identified in Table 5.

### *Number, type and size of holdings*

4.3.41 Table 5 sets out the current understanding of main farm holdings within this study area. The details of holdings have been obtained from face-to-face interviews with farm owners and occupiers. Publicly-available sources have been used to obtain information about farm holdings where it has not yet been possible to arrange interviews and this information will be validated as survey work continues. Other farm holdings may be identified as survey work continues and the design develops. Effects on these farm holdings will be reported in the formal ES.

4.3.42 Table 5 also sets out the sensitivity of individual holdings to change. This is determined by the extent to which they have the capacity to absorb or adapt to impacts, which in turn is determined primarily by their nature and scale. In general terms, larger holdings have a greater capacity to change enterprise mix and scale, can better absorb impacts and are less sensitive. Units that rely on the use of buildings (such as intensive livestock and dairy farms, and horticultural units) are less able to accommodate change and have a higher sensitivity. Non-commercial land uses and units, such as pony paddocks associated with residential properties, have a low sensitivity.

Table 5: Summary of characteristics of holdings

| Holding name | Holding type | Holding size (ha) | Diversification | Agri-environment scheme | Sensitivity to change |
|---|---|---|---|---|---|
| Land at Agdenlane Farm* | Arable | 2 | Not known | Not known | Medium |
| Land at Heatley Heath Farm* | Grassland | 3 | Not known | Not known | Low |
| Wet Gate Farm | Arable and grassland | 100 | None | None | Medium |
| Wet Gate Lane Farm | Beef cattle and arable | 40 | Livery stables and caravan storage | None | Medium |
| Lower Carr Green Farm | Arable and grassland | 32 | None | ELS | Medium |
| Moss Brow Farm | Potatoes, vegetables and grassland | 83 | Farm shop and phone mast | HLS | Medium |
| Yew Tree House Farm | Arable and grassland | 263 | None | None | Low |
| Land at Moss Brow | Grassland | 5 | None | None | Low |
| Warburton Park | Arable and grassland | 140 | None | None | Medium |
| Land at Millbank Hall Farm* | Grassland | 5 | Not known | Not known | Low |
| Bridge Farm | Arable | 97 | None | None | Medium |
| Mount Pleasant Farm | Arable | 13 | None | None | Medium |
| Land at Glazebrook* | Arable | 15 | Not known | Not known | Medium |
| Moss Farm, Glazebrook | Grassland | 3 | None | None | Low |
| Church Farm | Grassland | 12 | Riding for the Disabled | None | Medium |
| Land at Glazebrook Moss* | Arable | 100 | Not known | Not known | Medium |

* It has not yet been possible to arrange farm impact assessment interviews with these holdings. Publicly available sources have been used to obtain the information presented.

## 4.4 Effects arising during construction

### Avoidance and mitigation measures

4.4.1 In addition to design features that would be included in the Proposed Scheme to mitigate the impacts on farm holdings, there is a need to avoid or reduce environmental impacts to soils during construction. Soil resources from the areas

required temporarily and permanently for the Proposed Scheme would be stripped and stored. This would enable agricultural land that is required temporarily for construction to be returned to agricultural use. It would also enable soils to be returned to other uses, such as to support landscape planting and biodiversity, and to a suitable condition whereby they would be able to fulfil the identified function.

4.4.2 Compliance with the Code of Construction Practice (CoCP)[37] will avoid or reduce environmental impacts during construction. Those measures that are particularly relevant to agriculture, forestry and soils are set out in the draft CoCP and relate to:

- the reinstatement of agricultural land that is used temporarily during construction to agriculture, where this is the agreed end use (Section 6);
- the provision of a method statement within the farm pack for stripping, handling, storing and replacing agricultural and woodland soils to reduce risks associated with soil degradation on areas of land to be returned to agriculture and woodland following construction, based on detailed soil survey work to be undertaken prior to construction. This would include any remediation measures necessary following the completion of works (Section 6);
- a requirement for contractors to monitor and manage flood risk and other extreme weather events, insofar as reasonably practicable, that may affect agriculture, forestry and soil resources during construction (Sections 5 and 16);
- arrangements for the maintenance of farm and field accesses affected by construction (Section 6);
- the protection and maintenance of existing land drainage and livestock water supply systems, where reasonably practicable (Sections 6 and 16);
- the protection of agricultural land adjacent to the construction site, including the provision and maintenance of appropriate stock-proof fencing (Sections 5, 6, 9 and 12);
- the adoption of measures to control the deposition of dust on adjacent agricultural crops (Section 7);
- the control of invasive and non-native species; and the prevention of the spread of weeds generally from the construction site to adjacent agricultural land (Section 9);
- the adoption of measures to prevent, insofar as reasonably practicable, the spread of soil-borne, tree, crop and animal diseases from the construction area (Sections 6 and 9); and
- liaison and advisory arrangements with affected landowners, occupiers and agents, as appropriate (Sections 5 and 6).

[37] Supporting document: Draft Code of Construction Practice

4.4.3 As part of the ongoing development of the design, the following measures have been incorporated at this stage to avoid or mitigate adverse impacts on agriculture, forestry or soils:

- an agricultural crossing incorporated into the permanent realignment of Warburton Footpath 3 over the Warburton Footpath 3 farm accommodation overbridge to mitigate severance for Moss Brow Farm (CT-06-323);
- the realignment of the Church Farm accommodation access CT-06-326a); and
- the effect of severance of agricultural land for various holdings (including Wet Gate Farm, Lower Carr Green Farm and Warburton Park) is also reduced as the River Bollin viaduct and the Manchester Ship Canal viaduct have been designed to accommodate agricultural machinery passing underneath.

4.4.4 As the design develops it will be necessary to continue to assess the requirement for access to severed parcels of agricultural land and any changes will be reported in the formal ES.

4.4.5 Upon completion of construction, it is currently anticipated that soils replaced for agricultural, forestry or landscape uses would be monitored to identify any unsatisfactory growing conditions during the five-year aftercare period. Where agricultural uses are to be resumed on land disturbed during the construction of the Proposed Scheme, the design objective is to avoid any reduction in long term capability, which would downgrade the quality of the disturbed land, through the adoption of good practice techniques in handling, storing and reinstating soils on that land. Some poorly or very poorly drained land or land with heavier textured soils (such as the soils in the Salop and Conway associations) may also require particularly careful management, such as the timing of cultivation and livestock grazing, during the aftercare period to ensure this outcome.

## Assessment of impacts and effects

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

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

- part of the operational railway or associated infrastructure and kept under the control of the operator;

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

### *Temporary effects during construction*

#### Impacts on agricultural land

4.4.8 Interpretation of publicly available data shows that the land required for the Proposed Scheme is likely to require approximately 131ha of agricultural land within the Broomedge to Glazebrook area during the construction phase, of which approximately 92ha (70%) are likely to be classified as BMV land (Grades 1, 2 and 3a). This is a high magnitude of impact on BMV land.

4.4.9 As BMV land in this local area is a receptor of low sensitivity, it is currently anticipated that the likely effect of land required for the Proposed Scheme on BMV land during the construction phase would be moderate adverse, which is significant.

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

#### Nature of the soil to be disturbed

4.4.11 The sensitivity of the soils disturbed by construction activity reflects their textural characteristics, in the light of local FCDs, as set out in the SMR. In areas with the highest number of FCDs, and during the wettest times of the year, soils with high clay and silt fractions are most susceptible to the effects of handling during construction and the re-instatement of land; whereas soils with a high sand fraction in areas with the fewest number of FCDs and during the driest times of the year are the least susceptible.

4.4.12 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[38]. These principles would be followed throughout the construction period.

4.4.13 Peaty, clayey and seasonally waterlogged soils (including soils in the Salop, Conway and Turbary Moor association) are least able to remain structurally stable if moved in wet conditions or by inappropriate equipment. They are susceptible to compaction and smearing, which could affect successful reinstatement.

4.4.14 The disturbance of peat soils has implications for carbon emissions and biodiversity. Design development of the Proposed Scheme would seek to reduce disturbance of

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

any deep peat soils as far as possible. Where disturbance cannot be avoided, the peat soils would be handled with particular care to avoid compaction when wet and wind erosion when dry. When reinstated, opportunities would be taken where reasonably practicable to use peat soils to create habitats, enhance biodiversity and build carbon reserves.

4.4.15 Implementation of the measures set out in the draft CoCP would reduce the magnitude of impact on soil. The detailed soil survey data will define the sensitivity of soil, and the assessment of the effects on soils to be disturbed will be reported in the formal ES.

### Impacts on holdings

4.4.16 Land may be required for the Proposed Scheme from holdings temporarily, during the construction period, or permanently. In most cases, the temporary and permanent land requirement would occur simultaneously at the start of the construction period and it is the combined effect of both that would have the most impact on the holding. During the construction period, some agricultural land would be restored and the impact on individual holdings would reduce.

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

4.4.18 The potential temporary effects from the construction of the Proposed Scheme on individual agricultural and related interests are summarised in Table 6 for those holdings currently identified. The scale of the impact of land required to construct the Proposed Scheme is based on the likely proportion of land required from the holding during construction. The effects of severance will be judged on the ease and availability of access to severed land. With the implementation of the measures set out in the draft CoCP, these would generally be the same during and post construction.

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

Table 6: Summary of temporary effects on holdings from construction

| Holding name/sensitivity to change | Land potentially required | Potential severance impact | Potential scale of effect |
|---|---|---|---|
| Land at Agdenlane Farm<br>Medium sensitivity | High | Negligible | Major/moderate adverse |
| Land at Heatley Heath Farm<br>Low sensitivity | High | Negligible | Moderate adverse |
| Wet Gate Farm<br>Medium sensitivity | Low | Low | Minor adverse |
| Wet Gate Lane Farm<br>Medium sensitivity | Medium | High | Major/moderate adverse |
| Lower Carr Green Farm<br>Medium sensitivity | High | Low | Major/moderate adverse |
| Moss Brow Farm<br>Medium sensitivity | Medium | Low | Moderate adverse |
| Yew Tree House Farm<br>Low sensitivity | Negligible | Negligible | Negligible |
| Land at Moss Brow<br>Low sensitivity | High | High | Moderate adverse |
| Warburton Park<br>Medium sensitivity | High | Medium | Major/moderate adverse |
| Land at Millbank Hall Farm<br>Low sensitivity | Medium | Negligible | Minor adverse |
| Bridge Farm<br>Medium sensitivity | High | Medium | Major/moderate adverse |
| Mount Pleasant Farm<br>Medium sensitivity | High | Medium | Major/moderate adverse |
| Land at Glazebrook<br>Medium sensitivity | Low | Medium | Moderate adverse |
| Moss Farm, Glazebrook<br>Low sensitivity | Medium | Negligible | Minor adverse |
| Church Farm<br>Medium sensitivity | High | Negligible | Major/moderate adverse |
| Land at Glazebrook Moss<br>Medium sensitivity | High | Medium | Major/moderate adverse |

4.4.20 Overall, the construction of the Proposed Scheme could potentially affect 16 holdings in the Broomedge to Glazebrook area temporarily. On the basis of information currently available, 11 holdings could experience moderate, or major/moderate temporary effects from construction the majority due to the proportion of land required, which would be significant for each holding.

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

### *Permanent effects of construction*

#### Impacts on agricultural land

4.4.22 Interpretation of publicly available data shows that the Proposed Scheme is likely to require approximately 63ha of agricultural land permanently within the Broomedge to Glazebrook area, of which approximately 44ha (70%) are likely to be classified as BMV land (Grades 1, 2 and 3a). This is a high magnitude of impact on BMV land.

4.4.23 As BMV land in this local area is a receptor of low sensitivity, it is currently anticipated that the likely effect of land required for the Proposed Scheme on BMV land following construction will be moderate adverse, which is significant.

#### Impacts on forestry land

4.4.24 It is currently anticipated that no areas of commercial forestry land would be required for the Proposed Scheme in this study area.

#### Impacts on holdings

4.4.25 The potential permanent effects from the construction of the Proposed Scheme on individual agricultural and related interests are summarised in Table 7 for those holdings currently identified. The scale of the impact of land required to operate the Proposed Scheme is based on the likely proportion of land required from the holding. The potential effects of severance are judged on the ease and availability of access to severed land once construction is completed. The impact on farm infrastructure refers mainly to the potential loss of or damage to farm capital, such as property, buildings and structures, and the consequential effects on land uses and enterprises.

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

Table 7: Summary of permanent effects on holdings from construction

| Holding name/sensitivity to change | Land potentially required | Potential severance impact | Potential impact on farm infrastructure | Potential scale of effect |
|---|---|---|---|---|
| Land at Agdenlane Farm<br>Medium sensitivity | High | Negligible | Low | Major/moderate adverse |
| Land at Heatley Heath Farm<br>Low sensitivity | High | Negligible | High | Moderate adverse |
| Wet Gate Farm<br>Medium sensitivity | Low | Low | Low | Minor adverse |
| Wet Gate Lane Farm<br>Medium sensitivity | Medium | High | Low | Major/moderate adverse |

| Holding name/sensitivity to change | Land potentially required | Potential severance impact | Potential impact on farm infrastructure | Potential scale of effect |
|---|---|---|---|---|
| Lower Carr Green Farm<br>Medium sensitivity | High | Low | Low | Major/moderate adverse |
| Moss Brow Farm<br>Medium sensitivity | Medium | Low | Medium | Moderate adverse |
| Yew Tree House Farm<br>Low sensitivity | Negligible | Negligible | Negligible | Negligible |
| Land at Moss Brow<br>Low sensitivity | High | Negligible | Low | Moderate adverse |
| Warburton Park<br>Medium sensitivity | Low | Low | Low | Minor adverse |
| Land at Millbank Hall Farm<br>Low sensitivity | Medium | Negligible | Negligible | Minor adverse |
| Bridge Farm<br>Medium sensitivity | Medium | Low | Low | Moderate adverse |
| Mount Pleasant Farm<br>Medium sensitivity | Negligible | Negligible | Low | Minor adverse |
| Land at Glazebrook<br>Medium sensitivity | Low | Low | Low | Minor adverse |
| Moss Farm, Glazebrook<br>Low sensitivity | Negligible | Negligible | Negligible | Negligible |
| Church Farm<br>Medium sensitivity | Medium | Negligible | Low | Moderate adverse |
| Land at Glazebrook Moss<br>Medium sensitivity | Medium | Medium | Low | Moderate adverse |

4.4.27 Overall, the construction of the Proposed Scheme could potentially affect 16 holdings in the Broomedge to Glazebrook area permanently. On the basis of information currently available, nine holdings could experience moderate or major/moderate permanent effects from construction, which would be significant for each holding. For the majority of the holdings it is the proportion of land required that is most significant but for one holding (Heatley Heath Farm) property demolition is also significant.

4.4.28 Although financial compensation would be available under existing statutory arrangements, there can be no certainty that this would be used to reduce the above adverse effects by the purchase of replacement land or the construction of replacement buildings. Therefore, the above assessment should be seen as the worst case, which could be reduced if the owner and/or occupier is able, and chooses, to use compensation payments to replace assets.

### Other mitigation measures

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

4.4.30 Other mitigation would incorporate climate change adaptation and resilience measures, insofar as reasonably practicable. For example, restored soils in areas that could be prone to drought with climate change could potentially be replaced at greater depths than at present to make them resilient to drought.

4.4.31 A farm pack within the Phase 2b Farmers and Growers Guide would be provided to all farmers and landowners, setting out baseline conditions on the farm and the assurances and obligations that HS2 Ltd would accept upon entering the land. This would include advice and appropriate assistance where there is a need for the landowner to relocate or re-provide agricultural buildings displaced by the Proposed Scheme.

### Summary of likely residual significant effects

4.4.32 Although the extent of land required permanently by ALC grade in the Broomedge to Glazebrook area is not yet known, current indications based on publicly available information are that the effect on BMV agricultural land would be moderate adverse temporarily during construction, which would be significant. The significance of the effect on BMV agricultural land would be moderate adverse permanently from construction, which is significant. The amount of land required by ALC grade will be assessed and reported in the formal ES.

4.4.33 Eleven of the 16 farm holdings identified are anticipated to experience moderate or major/moderate temporary effects during construction, which would be significant for each holding. Nine holdings are anticipated to experience moderate or major/moderate permanent effects from construction, which would be significant for each holding.

4.4.34 Effects on forestry land and soils which are determined by on-going baseline studies will reported in the formal ES.

## 4.5 Effects arising from operation

### Avoidance and mitigation measures

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

### Assessment of impacts and effects

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

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

4.5.3 Six sets of farm buildings at Land at Agdenlane Farm, Little Heatley Farm[39], Moss Brow Farm, Warburton Park, Bridge Farm and Church Farm lie within approximately 100m of the route of the Proposed Scheme. The potential for significant effects on sensitive livestock receptors from noise will be assessed and reported in the formal ES.

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

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

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

## Other mitigation measures

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

## Summary of likely residual significant effects

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

## Monitoring

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

4.5.9 There are no area-specific requirements identified for monitoring agriculture, forestry and soil during the operation of the Proposed Scheme in the Broomedge to Glazebrook area.

[39] Little Heatley Farm is farmed as part of Agden Brook Farm which lies in the Pickmere to Agden and Hulseheath (MA03) study area. The impact of the Proposed Scheme on Agden Brook Farm (including Little Heatley Farm) is reported in Volume 2: Community area report MA03, Pickmere to Agden and Hulseheath.

# 5 Air quality

## 5.1 Introduction

5.1.1 This section of the report provides an assessment of the impacts and likely significant effects on air quality identified to date arising from the construction and operation of the Proposed Scheme within the Broomedge to Glazebrook area. Oxides of nitrogen (NOx) including nitrogen dioxide ($NO_2$), fine particulate matter[40] (PM10, PM2.5) and dust have been considered in the assessment. Emissions of all or some of these air pollutants are likely to arise from construction activities, demolition, site preparation works and the use of site haul routes. Emissions would also arise from road traffic during construction and operation of the Proposed Scheme.

5.1.2 Engagement with Warrington Borough Council (WBC), Salford City Council (SaCC) and Trafford Metropolitan Borough Council (TMBC) has commenced and is ongoing. The purpose of this engagement has been to obtain relevant baseline information, which includes monitoring data in this area.

5.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme are provided in the Volume 2: MA04 Map Book.

## 5.2 Scope, assumptions and limitations

5.2.1 The scope, assumptions and limitations for the air quality assessment are set out in Volume 1 (Section 8) and the Scope and Methodology Report (SMR)[41].

5.2.2 The study areas for the air quality assessment have been determined on the basis of where impacts on local air quality may occur[42]:

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

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

[40] 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.
[41] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report
[42] The assessment of construction dust emissions has been undertaken where sensitive receptors are located up to a distance of 350m from dust generating activities. The assessment of traffic emissions will be undertaken where sensitive receptors are located up to a distance of 200m from roads screened in for further assessment.

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

## 5.3 Environmental baseline

### Existing baseline

#### *Background air quality*

5.3.1 The main sources of air pollution in the Broomedge to Glazebrook area are emissions from road vehicles and agricultural activities. The main roads within the area include the M6 from Lymm to Woolston, the A57 Manchester Road from Woolston to Irlam and the A6144 Bent Lane/Paddock Lane/Warburton Lane from Lymm to Carrington.

5.3.2 There are eight industrial installations (regulated by the Environment Agency) with permits for emissions to air, namely Avdel UK Ltd metal surface treatment site, Midlands and Peterhouse Farm, National Grid Gas Plc Warrington compressor station, Collier Industrial Waste Ltd Rixton landfill site, the Cleansing Service Group Ltd facility, SAICA Paper UK Ltd Partington paper mill, Basell Polyolefins UK Ltd Carrington plant and Carrington Power Station. The contribution of all industrial processes and other emission sources to local air quality is included within the background concentrations.

5.3.3 Estimates of background air quality have been obtained from the Department for Environment, Food and Rural Affairs (Defra)[43] for the baseline year of 2017. The data are estimated for 1km grid squares for NOx, NO2, PM10 and PM2.5. Background concentrations are well within the air quality standards for all pollutants within the Broomedge to Glazebrook area.

#### *Local monitoring data*

5.3.4 There are currently three local authority diffusion tube sites located within the Broomedge to Glazebrook area for monitoring NO2 concentrations. These are located at a roadside location along the M6 and urban background locations at Irlam Police Station and Irlam Locks. Measured concentrations in 2016 were above the air quality standard at the M6 site and within the air quality standard at the background sites[44].

5.3.5 There is also one automatic monitoring station (part of Defra's Automatic Urban Rural Monitoring Network (AURN)) located within the Broomedge to Glazebrook area for monitoring NO2 concentrations. It is in a rural background location in Glazebury. Measured concentrations in 2016 were within the air quality standard.

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

### *Air quality management areas*

5.3.6 There are two air quality management areas (AQMAs) within the Broomedge to Glazebrook area, designated for exceedances in the annual mean NO2 standard. The first is the Greater Manchester Combined Authority AQMA, which covers a number of areas in the Greater Manchester area, including the M62 from Woolden to Irlam and sections of B5320 Liverpool Road, and was declared in May 2016. The second is the Warrington AQMA No. 1, which covers a 50m continuous strip on both sides of the M6, M62 and M56 motorway corridors, within the WBC area, and was declared in November 2001.

### *Receptors*

5.3.7 Several locations have been identified in the area as sensitive receptors. These are considered to be susceptible to changes in air quality, due to their proximity to dust generating activities or traffic routes during construction or operation of the Proposed Scheme.

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

5.3.9 There are six statutory designated ecological sites identified within the Broomedge to Glazebrook area, namely Rixton Clay Pits Special Area of Conservation (SAC), Manchester Mosses SAC, Rixton Clay Pits Site of Special Scientific Interest (SSSI), Woolston Eyes SSSI, Holcroft Moss SSSI and Risley Moss SSSI.

5.3.10 Other non-statutory sensitive ecological sites identified close to the Proposed Scheme include Coroners Wood Site of Biological Interest (SBI), Fox Covert and Meadows SBI and Great Woolden Wood SBI. Further details of the ecological receptors are set out in Section 7, Ecology and biodiversity.

## 5.4 Effects arising during construction

### Avoidance and mitigation measures

5.4.1 Emissions to the atmosphere will be controlled and managed during construction through the route-wide implementation of the CoCP. The draft Code of Construction Practice (CoCP)[45] includes a range of mitigation measures that are accepted by the Institute of Air Quality Management (IAQM) as being suitable to reduce impacts to as low a level as is reasonably practicable. These measures are generally sufficient to avoid any significant effects from dust during construction.

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

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

[45] Supporting document: Draft Code of Construction Practice

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

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

## Assessment of impacts and effects

### *Temporary effects*

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

#### Construction dust effects

5.4.5 The risks of demolition of existing buildings, earthworks, construction of new structures and trackout[46] have been assessed for their effect on dust soiling, human health[47] and ecological sites. There are residential and ecological receptors located within the Broomedge to Glazebrook area.

5.4.6 It has been identified that the risk of dust effects from demolition activities would range from negligible to medium, depending on the location of sensitive receptors and the magnitude of the activities. The risk of human health effects from demolition would be negligible. For earthworks, the risk of dust effects would range from low to high risk, depending on the location of sensitive receptors and the magnitude of the activities. There would also be a low risk of human health effects from earthworks. For construction, the risk of dust effects would range from negligible to high within this area, depending on the location of sensitive receptors and the magnitude of the activities. There would also be a negligible to low risk of human health effects from

[46] 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
[47] Human health effects relate mainly to short-term exposure to particles of size between 2.5µm to 10µm, measured as PM10

construction. For trackout, there would be a medium to high risk of dust effects and a low risk of human health effects.

5.4.7 The risk of ecological effects would range from low to high in this area, depending on the location of sensitive receptors and the magnitude of the construction activities. No demolition activities would affect any ecological receptors.

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

#### Construction traffic effects

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

5.4.10 The A57 Manchester Road/Liverpool Road/Cadishead Road, A57 Manchester Road, Manchester Road in Hollins Green, A57 Cadishead Way, Dam Lane, Dam Head Lane, B5212 Glazebrook Lane, Bradshaw Lane, B5159 Mill Lane, A6144 Mill Lane, A6144 Bent Lane, A6144 Paddock Lane, A6144 Warburton Lane, Manchester Road in Partington, A6144 Manchester Road and A6144 Carrington Lane would likely provide the primary access for construction vehicles in this area. An increase in traffic flows as a result of construction traffic, temporary closures or diversions is anticipated on these roads. A detailed assessment of air quality impacts from traffic emissions in the area will be undertaken and reported in the formal ES.

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

### *Permanent effects*

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

## Other mitigation measures

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

## Summary of likely residual significant effects

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

## 5.5 Effects arising from operation

### Avoidance and mitigation measures

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

### Assessment of impacts and effects

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

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

#### *Operational traffic effects*

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

### Other mitigation measures

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

### Summary of likely residual significant effects

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

### Monitoring

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

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

# 6 Community

## 6.1 Introduction

6.1.1 This section of the report describes the impacts and likely significant effects identified to date on local communities resulting from the construction and operation of the Proposed Scheme in the Broomedge to Glazebrook area.

6.1.2 The assessment draws on information gathered from engagement with the users and operators of community facilities including Rixton-with-Glazebrook Community Hall and The Black Swan public house. The purpose of this engagement has been to understand how the facilities are used and to obtain relevant baseline information to inform the design development and assessment of the Proposed Scheme. Engagement will continue with these and other stakeholders to inform the formal ES.

6.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme are provided in the Volume 2: MA04 Map Book.

## 6.2 Scope, assumptions and limitations

6.2.1 The assessment scope, key assumptions and limitations for the community assessment are set out in Volume 1 (Section 8) and the Scope and Methodology Report (SMR)[48].

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

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

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

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

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

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

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

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

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

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

## 6.3 Environmental baseline

6.3.1 The Proposed Scheme through the Broomedge to Glazebrook area would be approximately 7.3km in length within the Warrington Borough Council (WBC) and the Trafford Council areas. While the route of the Proposed Scheme does not pass through, it passes close to the City of Salford Council area. It would extend from Broomedge in the south, passing close to the settlements of Broomedge, Little Heatley, Warburton, Partington, Hollins Green, Cadishead and Glazebrook in the north.

6.3.2 The Broomedge to Glazebook area is predominantly rural in nature; the majority of community facilities are located in the larger settlements of Lymm, Partington and Cadishead. These settlements border existing key transport routes, namely the A6144 Rushgreen Road/A6144 Warburton Lane and the A57 Manchester Road/A57 Cadishead Way.

## Warburton, Partington and surrounds

6.3.3 This area covers the settlements of Warburton, Partington and surrounds, from the southern boundary of the Broomedge to Glazebrook area to the Manchester Ship Canal to the north.

6.3.4 Warburton, a village with approximately 75 residential properties, is located to the west of the route of the Proposed Scheme. The nearest residential properties would be approximately 100m from the Proposed Scheme. Community resources in Warburton are limited to two churches – St Werburgh's Church Old and New.

6.3.5 Mossbrow, which has approximately ten residential properties, is located to the east of the route of the Proposed Scheme. The nearest residential properties would be approximately 70m from the route of the Proposed Scheme. Community resources in Mossbrow are limited to the Saracens Head public house.

6.3.6 Partington, which has approximately 3,400 residential properties, is located to the north east of the route of the Proposed Scheme. The nearest residential properties would be approximately 450m from the Proposed Scheme. There are many facilities within Partington including schools: Little Oaks, Gillitots, Moss View Community School, Our Lady of Lourdes Roman Catholic Primary School, Partington Central Academy, Broadoak School, and Forest Gate Academy, three care homes, a number of GP surgeries, Partington Children's Centre, recreational facilities such as the Partington Sports Village and open spaces such as Coroners Wood.

6.3.7 The village of Broomedge, which has approximately 230 residential properties, is located to the south west of the route of the Proposed Scheme. The nearest residential properties would be approximately 850m from the Proposed Scheme. Lymm Riding School and the Agden moorings of The Lymm Cruising Club are located on the outskirts of Broomedge both along the Bridgewater Canal. The Lymm Cruising Club is a members-only boating club based in Lymm offering recreational moorings along the Bridgewater Canal. The Agden mooring site is immediately adjacent to Hesford Marine (a boat repair and maintenance service supplier) and to the north west of Spring Lane bridge, which is approximately 250m from the route of the Proposed Scheme.

6.3.8 Little Heatley is a hamlet with nine residential properties and no community facilities, the settlement is surrounded with farmland. Some residential properties would be on the route of the Proposed Scheme.

6.3.9 Promoted PRoW in the area include the Trans Pennine Trail and National Route 62 of the National Cycle Network, a predominantly traffic-free route which links Fleetwood, (in Lancashire) with Selby (North Yorkshire) via the Trans Pennine Trail; the Cheshire Ring Canal Walk along the Bridgewater Canal towpath; the Mersey Valley Timberland Trail and the Bollin Valley Way (a 40km walking route linking Macclesfield Riverside Park in Cheshire East with Partington) along the Manchester Ship Canal towpath.

### Hollins Green, Cadishead, Glazebrook and surrounds

6.3.10 This area covers the settlements of Hollins Green, Cadishead, Glazebrook and surrounds, from the Manchester Ship Canal in the south to the northern boundary of the Broomedge to Glazebrook area.

6.3.11 The village of Hollins Green has approximately 400 residential properties. The nearest residential properties would be approximately 50m from the route of the Proposed Scheme. Hollins Green has a small number of community facilities, including St Helen's Church of England Primary School, St Helen's Church, Hollinfare Cemetery, Rixton-with-Glazebrook Community Hall, a community shop, a post office, two public houses (The Black Swan and Ye Olde Red Lion) and a recreation ground. The A57 Manchester Road runs to the south of the village.

6.3.12 Further west of Hollins Green is Rixton Clay Pits Nature Reserve. The reserve is a 40ha site of special scientific interest (SSSI) featuring woodland and meadow habitats, several lakes, special wildlife, walking routes, fishing facilities, a visitor centre and car park.

6.3.13 Cadishead, a suburb of Salford, is located north of the Manchester Ship Canal and north east of the route of the Proposed Scheme. The settlement has approximately 2,000 residential properties. The nearest residential properties would be approximately 400m from the route of the Proposed Scheme. It has a range of community facilities including schools (JitterBugz Day Nursery, St Mary's Church of England Primary School, Cadishead Primary School and Irlam and Cadishead College), several places of worship, public houses and cafes, and three recreational grounds. This settlement is bordered by the A57 Cadishead Way to the south and the Liverpool to Manchester (via Warrington Central) railway line to the north.

6.3.14 The village of Glazebrook, which has approximately 100 residential properties, is located to the east of the route of the Proposed Scheme. The nearest residential property would be on the route of the Proposed Scheme. There are limited community facilities in Glazebrook, namely, Glazebrook Methodist Church and a post office. Camsley Horse Riding for the Disabled is located on the outskirts of Glazebrook and would be adjacent to the route of the Propose Scheme.

6.3.15 Promoted PRoW in the area include the Glazebrook Timberland Trail, a long-distance walking route which links Pennington Flash Country Park to the Manchester Ship Canal in Cadishead.

## 6.4 Effects arising during construction

### Avoidance and mitigation measures

6.4.1 The draft Code of Construction Practice (CoCP)[49] includes a range of provisions that will help mitigate community effects associated with construction within this area, including:

[49] Supporting document: Draft Code of Construction Practice

- implementation of a community engagement framework to provide appropriate information and resolve community issues (Section 5 of the draft CoCP);
- sensitive layout of construction sites to reduce nuisance as far as possible (Section 5);
- maintenance of PRoW during construction where reasonably practicable (Section 14);
- monitoring and management of flood risk and other extreme weather events, where reasonably practicable, which may affect community resources during construction (Section 16);
- specific measures in relation to air quality and noise will also serve to reduce impacts for the neighbouring communities including discretionary noise insulation for sensitive community resources and, in special circumstances, temporary rehousing (Sections 7 and 13); and
- where practicable, the avoidance of HGVs operating adjacent to schools during drop off and pick up periods (Section 14).

## Assessment of impacts and effects

### *Temporary effects*

#### Residential properties

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

#### Community facilities

6.4.3 Construction of the Manchester Ship Canal viaduct would require approximately 0.01ha of outdoor space for a period of three years and three months. This outdoor space comprises of garden space and a shed, at the rear of Rixton-with-Glazebrook Community Hall in Hollins Green. The community hall building is available to hire and is currently used for various daytime and evening activities including karate, indoor bowling, art classes, sequence dancing classes and craft sessions. The community hall is additionally the venue for monthly and annual events such as Rixton-with-Glazebrook Parish Council and the Glazebrook Women's Institute meetings and the annual village show. The temporary requirement for this land would not affect the functioning of the community hall and no land from the site would be required on a permanent basis.

6.4.4 Access to the community hall is provided via the A57 Manchester Road and would be maintained throughout the three years and three months construction period. While there may be some minor disruptions at points during this period, the ability of users to access the community hall would not be affected. The temporary requirement for

land at the Rixton-with-Glazebrook Community Hall would result in a minor adverse effect, which is not considered to be significant.

6.4.5 Construction of the Manchester Ship Canal viaduct would require 0.1ha of land at The Black Swan public house in Hollins Green for a period of approximately three years and three months. The A57 Manchester Road main compound would also be located adjacent to The Black Swan. The Black Swan comprises a sports bar and restaurant, function rooms, 14 guest bedrooms, a children's outdoor play area, beer garden and car park. Approximately, 0.06 ha of car parking space (comprising 22 of the 34 parking bays) and 0.04ha of the pub's 0.5ha outdoor space and play area would be temporarily required. There would be no permanent requirement for land. Ye Olde Red Lion, located approximately 200m south of The Black Swan on the A57 Manchester Road, the only other public house in Hollins Green, does not have a play area or beer garden.

6.4.6 Access to The Black Swan public house is provided via the A57 Manchester Road and would be maintained throughout the three-year construction period. The temporary requirement for land would have an impact on the ability of customers to park at the public house and the disruption to the beer garden may also affect customer choices. The Black Swan public house is considered to play a role as a resource for the community. The temporary requirement for land at The Black Swan would result in a moderate adverse effect, which would be significant.

### Recreational facilities

6.4.7 Construction of the Bridgewater Canal underbridge would temporarily affect the 400m Agden mooring site of the Lymm Cruising Club on the Bridgewater Canal on the outskirts of Broomedge. The construction period is likely to last for approximately one year and nine months. Lymm Cruising Club is a members-only boating club based in the settlement of Lymm, approximately 3km west of the Agden mooring site. The Lymm Cruising Club comprises three recreational mooring sites along the Bridgewater Canal (Lymm Clubhouse, Oughtrington, and Agden), and a clubhouse and bar which are not open to the public. Electricity points are available for each boat at the Lymm Clubhouse and Agden mooring sites.

6.4.8 Land required would temporarily remove approximately 14 of the estimated 25 mooring spaces along the Bridgewater Canal between Spring Lane bridge and Hesford Marine. There is a two year waiting list for moorings at the Lymm Cruising Club. The nearest alternative is Hesford Marine which is adjacent to the Agden mooring site and has approximately 10 moorings and 70 hard standing (out of water) spaces. Hesford Marine currently has hard standing spaces available, so may be able to accommodate some of the losses at the Agden mooring site, although this possibility has not been assumed in this assessment. Bridgewater Canal licence holders are requested to follow Section 9 of the Manchester Ship Canal Act 1960 which states that vessels are not permitted to be left in any river canal waterway, navigable channel lock or dock forming part of the Bridgwater for any period exceeding one month. As such, the Agden moorings are for temporary/recreational use. The loss of 14 of the estimated 25 Agden moorings spaces during the construction period of approximately one year and nine months has been identified as a moderate adverse effect, which would be significant.

6.4.9 Construction of the Bridgewater Canal underbridge would temporarily require approximately 0.008ha of field space from the Lymm Riding School on the outskirts of Broomedge. Lymm Riding School is a riding school with stables and approximately 2ha of dedicated equestrian riding fields. The temporary requirement for land at this location is not expected to affect the viability of the riding school. Access to the riding school via Spring Lane would be maintained throughout the construction period (approximately one year and nine months). The temporary requirement for land at Lymm Riding School would result in a minor adverse effect, which is not significant.

#### Open space and PRoW

6.4.10 Construction of the Bridgewater Canal underbridge would temporarily affect approximately 250m of the Bridgewater Canal towpath and Cheshire Ring Canal Walk to the north east of Broomedge, for approximately one year and nine months. Diversions would be put in place (where reasonably practical) to allow users to continue to use these routes throughout the construction period. Proposed mitigation and an assessment of the likely effects will be reported in the formal ES.

6.4.11 Construction of the River Bollin West viaduct would temporarily affect approximately 130m of the Trans Pennine Trail and National Cycle Route 62, which are located east of Heatley, for approximately one year. Diversions would be put in place (where reasonably practical) to allow users to continue to use these routes throughout the construction period. Proposed mitigation and an assessment of the likely effects will be reported in the formal ES.

6.4.12 Construction of the Manchester Ship Canal viaduct would temporarily affect 210m of the Manchester Ship Canal towpath and Bollin Valley Way to the south of Hollins Green for approximately three years. Diversions would be put in place (where reasonably practical) to allow users to continue to use these routes throughout the construction period. Proposed mitigation and an assessment of the likely effects will be reported in the formal ES.

### *Permanent effects*

#### Residential properties

6.4.13 Land required for the Lymm embankment would require the demolition of four residential properties on Wet Gate Lane in Little Heatley, a hamlet with nine residential properties in total. The permanent loss of these properties would result in a moderate adverse effect, which would be significant for this community.

6.4.14 On the outskirts of Glazebrook, land required for the Glazebrook embankment would require the demolition of one property on Dam Head Lane. This residential property would be permanently lost.

#### Community facilities

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

#### Recreational facilities

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

#### Open space and PRoW

6.4.17 In the area south of Mossbrow, the Bridgewater embankment and Warburton cutting would permanently require 150m of the Bollin Valley Way, severing this 40km long promoted PRoW. A permanent diversion would be implemented reconnecting the Bollin Valley Way via the proposed Warburton Footpath 3 overbridge. This would extend the route by approximately 600m. The permanent diversion of the Bollin Valley Way would result in a negligible adverse effect which would not be significant.

### Other mitigation measures

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

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

### Summary of likely residual significant effects

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

- The Black Swan public house in Hollins Green; and
- Agden mooring site of the Lymm Cruising Club on the outskirts of Broomedge.

6.4.21 Land required for the construction of the Proposed Scheme is likely to result in a permanent residual significant adverse effect due to the loss of four residential properties on Wet Gate Lane in Little Heatley.

### Cumulative effects

6.4.22 Community wide effects occur where a number of individual impacts on resources come together within a location and have a wider impact on the community, such that they change the experience of a considerable proportion of people within that community.

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

## 6.5 Effects arising from operation

### Avoidance and mitigation measures

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

### Assessment of impacts and effects

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

## Other mitigation measures

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

## Summary of likely residual significant effects

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

## Cumulative effects

6.5.5 Community wide effects occur where a number of individual impacts on resources come together within a location and have a wider impact on the community, such that they change the experience of a considerable proportion of people within that community.

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

## Monitoring

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

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

# 7 Ecology and biodiversity

## 7.1 Introduction

7.1.1 This section of the report identifies the predicted impacts and likely significant effects on species and habitats identified to date in the Broomedge to Glazebrook area as a consequence of the construction and operation of the Proposed Scheme. This includes effects on sites recognised or designated on the basis of their importance for nature conservation.

7.1.2 Engagement with stakeholders including Natural England, the Environment Agency, Forestry Commission, the Woodland Trust, Cheshire Wildlife Trust and the Greater Manchester Ecology Unit has commenced and is ongoing. The purpose of this engagement has been to discuss the Proposed Scheme and potential effects, obtain relevant baseline information and consider alternative locations for environmental mitigation. Engagement with these stakeholders and other local groups will continue as part of the development of the Proposed Scheme and inform the formal ES.

7.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme are provided in the Volume 2: MA04 Map Book.

7.1.4 All distances and area measurements in this section are approximate.

## 7.2 Scope, assumptions and limitations

7.2.1 The scope, assumptions and limitations for the ecological assessment are set out in Volume 1 (Section 8) and the Scope and Methodology Report (SMR)[50].

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

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

## 7.3 Environmental baseline

### Existing baseline

#### *Introduction*

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

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

7.3.2 The land required for the Proposed Scheme in this area consists largely of low lying land in mixed agricultural use. Areas of woodland and sections of hedgerow are present. The route of the Proposed Scheme crosses several watercourses, including the Bridgewater Canal, the River Bollin, Red Brook and the Manchester Ship Canal[51], as well as numerous drainage ditches and smaller watercourses.

7.3.3 Statutory and non-statutory designated sites are shown on Map Series CT-10, Volume 2: MA04 Map Book.

### *Designated sites*

7.3.4 There are two internationally important Special Areas of Conservation (SACs) of potential relevance to the assessment in the Broomedge to Glazebrook area:

- Rixton Clay Pits SAC covers an area of 13.7ha. It comprises parts of an extensive disused brickworks excavated in glacial till. The SAC is designated for its population of great crested newts, which are known to breed in at least 20 ponds across the site. The SAC is located west of Hollins Green, 1.1km west of the land required for Proposed Scheme and adjacent to the A57 Manchester Road, a proposed construction traffic access road; and
- Manchester Mosses SAC is 170.5ha in size and consists of three constituent sites located west of Manchester. The SAC is designated for the degraded raised bog which is considered an Annex I Habitat[52]. Holcroft Moss Site of Special Scientific Interest (SSSI) is the nearest component of the SAC, with its southern and western boundary located immediately adjacent to land west of Irlam that has been identified for the purpose of habitat creation or enhancement, as part of the Proposed Scheme. The remaining components of the SAC are Risley Moss SSSI, located east of Warrington 790m and west of the land required for the Proposed Scheme in the Risley to Bamfurlong area, and 1km from the land required for the Proposed Scheme in the Broomedge to Glazebrook area, and Astley and Bedford Mosses SSSI located south of Leigh, 3.4km east of land required for the Proposed Scheme in the Risley to Bamfurlong area and 3.8km north-east of land required for the Proposed Scheme in the Broomedge to Glazebrook area.

7.3.5 There are four nationally important SSSIs of potential relevance to the assessment in the Broomedge to Glazebrook area. For each of these sites, the land required for the Proposed Scheme in this area is within the Impact Risk Zone[53] relevant to railway infrastructure as identified by Natural England. They are:

- Rixton Clay Pits SSSI is 13.7ha in size and covers the same area as Rixton Clay Pits SAC. The SSSI is designated for its breeding population of great crested

[51] The Manchester Ship Canal is a canalised section of the River Mersey in the study area. It referred to as the Manchester Ship Canal throughout this report
[52] Annex 1 of the EU's Habitats Directive (1992) lists key habitat types whose conservation requires the designation of Special Areas of Conservation
[53] The Impact Risk Zones are a GIS tool developed by Natural England to make a rapid initial assessment of the potential risks to SSSIs posed by development proposals and indicate the types of development proposal which could potentially have adverse impacts

newts, which are of international value. It is also designated for its species-rich calcareous grassland and assemblage of wetland plants, including species that are rare or uncommon in Cheshire such as northern marsh-orchid, creeping willow, slender spike-rush, lesser marshwort, blunt-leaved pondweed and three species of stonewort. The SSSI is important for research into the succession of open habitats to scrub and mature secondary woodland. It is located west of Partington, 1.1km west of the land required for Proposed Scheme and adjacent to the A57 Manchester Road, which would be a proposed construction traffic access road;

- Woolston Eyes SSSI covers an area of 269.8ha and is designated for its breeding bird assemblage, including nationally important numbers of black-necked grebe, gadwall and pochard. It also supports nationally important wintering numbers of gadwall, teal, shoveler and pochard. This SSSI is located east of Warrington 2.7km west of the land required for the Proposed Scheme;

- Holcroft Moss SSSI is a constituent part of the Manchester Mosses SAC and covers an area of 19.4ha. It is designated as the only known uncut area of raised bog remaining in Cheshire. The surface vegetation of the moss is dominated by purple moor-grass with abundant heather, cross-leaved heath and cranberry. Wetter hollows support common cottongrass and deergrass. Five species of bog moss have been recorded in these hollows. The site supports dragonfly populations including the locally scarce black darter and notable breeding and wintering bird assemblages. The SSSI is located west of Irlam, within the Risley to Bamfurlong area and is immediately adjacent to the land required for the Proposed Scheme in the Broomedge to Glazebrook area; and

- Risley Moss SSSI covers an area of 83.2ha. It is designated as one of the last remaining fragments of the raised bog system that once covered large areas of South Lancashire and North Cheshire. 60ha of the SSSI is a constituent of the Manchester Mosses SAC. The SSSI is located east of Warrington, 790m west of the land required for the Proposed Scheme in the Risley to Bamfurlong area and 1km from land required for the Proposed Scheme in the Broomedge to Glazebrook area. It is addressed in Section 7, Ecology and biodiversity in Volume 2: Community area report MA05, Risley to Bamfurlong.

7.3.6 There is one Local Nature Reserve (LNR) of county/metropolitan value with potential relevance to the assessment in the Broomedge to Glazebrook area:

- Rixton Clay Pits LNR covers an area of 33.6ha. This site is located east of Warrington and 900m west of the land required for the Proposed Scheme. The LNR incorporates both the Rixton Clay Pits SAC and SSSI and is larger than the extent of those designated sites. The site is designated due to populations of great crested newt which are of international value.

7.3.7 There are four Local Wildlife Sites (LWS) and eight Sites of Biological Interest (SBI) of potential relevance to the assessment in the Broomedge to Glazebrook area, each of which is of county/metropolitan value. Citations provided by relevant organisations

have been used in the descriptions below, and where citations are outstanding, publicly available sources of information have been used. Details of site interest features and reasons for designation will be updated in the formal ES. The sites include:

- Helsdale Wood and Newhey's Plantation LWS which covers an area of 5.1ha. The LWS is designated for its woodland and disused quarry which has exposed rock faces with good bryophyte communities. Newhey's Plantation is damp woodland with a diverse ground flora. The LWS is also notable for birds. It is located east of Lymm and is 1km west of the land required for the Proposed Scheme and 0.4km from a proposed construction traffic access road;
- Heatley Lake LWS covers an area of 2.2ha. It is designated for its lake with dense marginal vegetation, reed swamp, wet neutral grassland and wet woodland. The LWS is located west of Heatley and 600m west of the land required for the Proposed Scheme;
- Rixton Brickworks LWS covers an area of 20.1ha. It is designated for its wetland habitats including a lake rich in submerged, floating and marginal vegetation and two smaller water bodies. There is also woodland with wildflowers and scrub. The LWS is located 900m west of the land required for the Proposed Scheme and adjacent to the A57 Manchester Road, which is a proposed construction traffic access road. Part of the LWS overlaps with Rixton Clay Pits SAC, SSSI and LNR;
- Rixton Moss LWS covers an area of 278ha. It is designated as an area of reclaimed mossland, now arable but retaining an extensive network of ditches. It has notable breeding populations of corn bunting and yellow wagtail and is also important for black darter dragonfly and brown hare. The LWS is located 1.2km west of the land required for the Proposed Scheme in the Broomedge to Glazebrook area;
- Fox Covert and Meadows SBI covers an area of 5.1ha and is designated for its lowland broadleaved and wet woodland habitats. The SBI is located north of Heatley and is partially within the land required for the Proposed Scheme;
- Wigsey Lane Meadows SBI covers an area of 5.6ha and is designated for its grassland habitats and birds. The SBI is located south of Warburton and is 0.8km west of the land required for the Proposed Scheme. It is potentially hydrologically linked to the land required for the Proposed Scheme via the catchment of the River Bollin and is 0.5km from the A6144 Bent Lane, a proposed construction traffic access road;
- Moss Wood SBI covers an area of 2.3ha and is designated for its woodland habitat. The SBI is located south of Partington and is 0.9km east of the land required for the Proposed Scheme. It is potentially hydrologically linked to the land required for the Proposed Scheme via a series of drains and is 0.7km from the A6144 Warburton Road, a proposed construction traffic access road;

- Coroners Wood SBI covers an area of 1.9ha and is designated for its woodland and grassland habitats. It is part of an area of ancient semi-natural woodland. The SBI is located south of Hollins Green and 40m east of the land required for the Proposed Scheme;
- Partington Nature Reserve SBI covers an area of 7.3ha. It is designated for its open water habitat and habitat mosaic. The SBI is located east of Partington, adjacent to a proposed construction traffic access road and 1.5km north east of the land required for the Proposed Scheme;
- Carrington Power Station SBI covers an area of 3.2ha. It is designated for its habitat mosaic. The SBI is located north-east of Partington 100m from the A6144 Manchester New Road, a proposed construction traffic access road and is 2.8km north east of the land required for the Proposed Scheme;
- Great Woolden Wood SBI covers an area of 5.7ha. It is designated for its woodland habitat. The SBI is 500m east of the land required for the Proposed Scheme in the Broomedge to Glazebrook area (though adjacent to the land required for the Proposed Scheme in the Risley to Bamfurlong area); and
- Cadishead Moss SBI covers an area of 8.6ha. It is designated for heathland and bog habitats and birds. The SBI is located north of Irlam 1.5km east of the land required for the Proposed Scheme and is potentially hydrologically linked to the land required for the Proposed Scheme.

7.3.8 There is one Ancient Woodland Inventory Site (AWIS) of potential relevance to the assessment in the Broomedge to Glazebrook area which is of county/metropolitan value. Coroners Wood AWIS comprises an area of 6ha of ancient semi-natural woodland. 1.9ha of the AWIS is also Coroners Wood SBI. It is located partially within the land required for the Proposed Scheme.

7.3.9 A review is being undertaken to identify any additional woodlands that are not currently listed on the AWI but that may nevertheless be ancient. These will be identified and assessed in the formal ES.

### *Habitats*

7.3.10 The following habitat types which occur in this area are relevant to the assessment.

#### Woodland

7.3.11 There are eight areas of lowland deciduous woodland (likely to qualify as habitats of principal importance[54] and local BAP [55] habitats) outside of designated sites which are within or partly within the land required for the Proposed Scheme. These woodland areas are located near Heatley, Mossbrow, Hollins Green, Glazebrook and Glazebrook Moss. On a precautionary basis, pending the findings of field surveys, these woodlands are considered to be of up to county/metropolitan value.

[54] Section 41 of the National Environment and Rural Communities Act 2007
[55] Cheshire BAP and Greater Manchester BAP

### Grassland

7.3.12 Grasslands outside designated sites are likely to be present within the land required for the Proposed Scheme. On a precautionary basis, pending the findings of field surveys (which may identify these as unimproved grasslands) these grasslands are considered to be of up to district/borough value.

### Hedgerows

7.3.13 Many of the hedgerows in the land required for the Proposed Scheme are likely to qualify as a habitat of principal importance and a local BAP habitat. Some may also meet the wildlife and landscape criteria to be 'important' hedgerows as defined in the Hedgerows Regulations 1997[56]. In addition, they could also provide commuting corridors, shelter and feeding habitat for wildlife. On a precautionary basis, pending the findings of field surveys, the hedgerow network is considered to be of up to district/borough value.

### Watercourses

7.3.14 The Bridgewater Canal, the River Bollin (and its tributary, the Old Bollin), Red Brook, the Manchester Ship Canal, which is a canalised section of the River Mersey and three tertiary rivers are within the land required for the Proposed Scheme. These watercourses may qualify as habitats of principal importance and local BAP habitats. On a precautionary basis, pending the findings of field surveys, these watercourses are assumed to be of up to county/metropolitan value. The smaller watercourses and several offline drains also within the land required for the Proposed Scheme are considered to be of up to district/borough value.

### Water bodies

7.3.15 There are six ponds that are located within, or partly within, the land required for the Proposed Scheme, one of which is within land identified for habitat creation or enhancement. Some may qualify as habitats of principal importance, or local BAP habitats (e.g. if they support fauna species of high conservation importance such as great crested newt). On a precautionary basis, pending the findings of field surveys, these ponds are assumed to be of up to county/metropolitan value.

### Ancient and veteran trees

7.3.16 Pending the results of the field surveys, it is possible that ancient and veteran trees are present within the land required for the Proposed Scheme and on a precautionary basis have been assumed to be of up to district/borough value. This will be confirmed in the formal ES.

## *Protected and notable species*

7.3.17 A summary of the likely value of fauna species of relevance to the assessment (excluding any features of species interest for which the sites described above are designated) is provide in Table 8.

[56] *Statutory Instrument 1997 No. 1160* Hedgerows Regulations 1997

Table 8: Species potentially relevant to the assessment within the Broomedge to Glazebrook area

| Resource/feature | Value | Rationale |
|---|---|---|
| Bats | Up to regional | The mosaic of hedgerows, connecting woodlands, watercourses, grassland and scattered trees provide suitable foraging and commuting habitat. Many of the buildings and trees within land required for the Proposed Scheme are likely to provide roosting habitat for bats. Eleven species of bats have been recorded within Cheshire[57] and soprano pipistrelle, common pipistrelle, noctule and brown long eared bat have been recorded within the vicinity of the Proposed Scheme. Existing data sources provided a record of a brown long-eared roost within 350m of the land required for the Proposed Scheme. |
| Otter | Up to county/metropolitan | Existing data sources include a record of otter within the land required for the Proposed Scheme on the River Bollin. There are additional records of this species at Rixton Clay Pits and near Glaze Brook/the Manchester Ship Canal. The River Bollin tributaries and the Manchester Ship Canal also have suitable habitat for otters. Otter is re-colonising the Greater Manchester and Cheshire area but the population in Cheshire is lower than would be expected compared to availability of suitable habitat and the rate of otter recolonization has been slow[58]. |
| Water vole | Up to county/metropolitan | Habitat suitable for water vole is present along the watercourses and drainage ditches in the Broomedge to Glazebrook area, such as the River Bollin and its tributaries and Glaze Brook. Existing data sources provided records of their presence along Red Brook, along Glaze Brook and its associated drains and at Rixton Clay Pits. The nearest record is at Red Brook in Coroner's Wood 0.3km east of the land required for the Proposed Scheme. Water vole are widespread and locally common in Cheshire[59] and Greater Manchester. It is considered possible that this species is present in suitable habitat throughout the area, including within watercourses in the land required for the Proposed Scheme. |
| Polecat | Up to county/metropolitan | Habitat suitable for polecat is present including hedgerows, farmland and woodland within the land required for the Proposed Scheme. Existing data sources provided no records of their presence. The polecat is considered rare but is recolonising Cheshire[60] and its status is unknown in Greater Manchester. |
| Great crested newt | County/metropolitan | There are six ponds within the land required for the Proposed Scheme, and an additional 62 ponds within 250m. Great crested newt is widespread in Cheshire and considered common but declining in Greater Manchester[61]. The nearest record for this species provided by existing data sources is 1.1km west of the land required for the Proposed Scheme. Environmental DNA surveys carried out during 2017 provided positive results in 11 ponds for this species within 250m of the land required for the Proposed Scheme. |

[57]Bats Local Biodiversity Action Plan – Cheshire Wildlife Trust https://www.cheshirewildlifetrust.org.uk/sites/default/files/2018-06/Bats.pdf
[58] Otter Local Biodiversity Action Plan – Cheshire Wildlife Trust https://www.cheshirewildlifetrust.org.uk/sites/default/files/2018-06/Otter.pdf
[59] Water vole Local Biodiversity Action Plan – Cheshire Wildlife Trust https://www.cheshirewildlifetrust.org.uk/sites/default/files/2018-06/Water%20vole.pdf
[60] Polecat Local Biodiversity Action Plan – Cheshire Wildlife Trust https://www.cheshirewildlifetrust.org.uk/sites/default/files/2018-06/Polecat.pdf
[61] [61] Great Crested Newt Species Action Plan Greater Manchester Biodiversity Project, 2009 http://www.gmbp.org.uk/site/images/stories/great%20crested%20newt%20bap_09.pdf

| Resource/feature | Value | Rationale |
|---|---|---|
| Birds | Up to county/metropolitan | The farmland and woodland throughout the Broomedge to Glazebrook area is suitable for breeding birds, with suitable habitat for wintering birds particularly around the River Bollin and the Manchester Ship Canal. There are existing records for barn owl, peregrine falcon, lapwing, yellowhammer, yellow wagtail, skylark, hobby, corn bunting, tree sparrow and grey partridge and a range of breeding woodland birds. |
| White-clawed crayfish | Up to county/metropolitan | Existing data sources provided no records of white-clawed crayfish within the Broomedge to Glazebrook area. However, suitable habitat is likely to be present along sections of the River Bollin and its tributaries. White-clawed crayfish is a local BAP species and the nearest known populations of this species are in catchments in southern Cheshire. |
| Aquatic invertebrates | Up to district/borough | Suitable habitat for notable assemblages of aquatic invertebrates is likely to be present in the Bridgwater Canal, River Bollin, Red Brook, smaller watercourses and in water bodies within the land required for the Proposed Scheme. Existing data sources have not provided records of notable aquatic invertebrate species. |
| Terrestrial invertebrates | Up to district/borough | Suitable habitat for notable assemblages of terrestrial invertebrates has been identified, such as at Coroner's Wood. Existing data sources have not provided records of notable terrestrial invertebrate species. |
| Fish | Up to district/borough | Existing data sources provided records of European eel, brown trout and European bullhead in river catchments affected by the Proposed Scheme, including the River Bollin and the Manchester Ship Canal. The European eel is declining across the UK. The European bullhead is listed on Annex II of the EC Habitats Directive. Whilst there are no records of Atlantic salmon or brook lamprey (all listed on Annex II of the EC Habitats Directive), there is suitable habitat within the land required for the Proposed Scheme to support these species. |
| Reptiles | Up to district/borough | Suitable habitat has been identified for widespread species of reptiles in the Broomedge to Glazebrook area throughout the land required for the Proposed Scheme, particularly around Mossbrow, Heatley and the Manchester Ship Canal. There are records from existing data sources of common lizard to the south of Holcroft Moss SSSI, including within the land required for the Proposed Scheme. |

## 7.4 Effects arising during construction

### Avoidance and mitigation measures

7.4.1 The following measures have been included as part of the design of the Proposed Scheme (in addition to the landscape planting shown on the Map Series CT-06 in the Volume 2 Map Book, along the rail corridor which would be largely a mixture of woodland/scrub and grassland) and would contribute towards mitigating the losses of habitat and effects on species:

- construction of viaducts over the River Bollin and its tributary, the Old Bollin, an unnamed watercourse, Red Brook, the Manchester Ship Canal and an unnamed tributary of Glaze Brook would reduce direct effects to these

watercourses and their flood plains and allow free passage for wildlife beneath them including along the rivers and their banks;

- construction of the Manchester Ship Canal viaduct would reduce habitat loss on Coroner's Wood AWIS;
- new woodland planting (5.8ha) would help towards compensation for the losses of woodland outside of designated sites (e.g. south of Fox Covert and south-west of Glazebrook) and to enhance connectivity between remaining woodlands;
- provision of new ponds for those lost, including two new ponds created for every one lost to the permanent works that support great crested newts, which would form part of the measures required to reduce the effects on great crested newts to not significant;
- provision of new species-rich hedgerows, using appropriate native species, would help towards compensation for the loss of hedgerows and re-connecting the ecological network in the surrounding area. This includes along the margins of the route, in specific areas such as Bradshaw Lane, Warburton Park, along the highway between Dam Lane and Bank Street and along Dam Head Lane; and
- provision of new grassland habitats (3.7ha south of the River Bollin and north of Mossbrow), including species rich grasslands would help towards compensation for the loss from the Proposed Scheme. These areas would also provide habitat for reptiles and invertebrates.

7.4.2 The assessment assumes implementation of the measures set out within the draft Code of Construction Practice (CoCP)[62], which includes translocation of protected species where appropriate.

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

- manage impacts from construction, including the timing of works, on designated sites, protected and notable species and other features of ecological importance such as ancient woodlands and watercourses;
- reduce habitat loss by keeping the working area to the reasonable minimum;
- reinstatement of areas of temporary habitat loss;
- restoration and replacement planting;
- implement management measures for potential ecological impacts to control dust, water quality and flow, noise and vibration, and lighting;
- provision of a watching brief, where relevant;

[62] Supporting document: Draft Code of Construction Practice

- relocation or translocation of species, soil and/or plant material, as appropriate;
- consultation with Natural England, the Environment Agency, local wildlife trusts and relevant planning authorities prior to and during construction; and
- compliance with all wildlife licensing requirements, including those for protected and invasive species and designated sites.

## Assessment of impacts and effects

7.4.4 The following section considers the impacts and effects on ecological features as a consequence of construction of the Proposed Scheme. All assessments have been undertaken on a precautionary basis, in the absence of survey information and take account of the baseline value as presented in Section 7.3.

### *Designated sites*

7.4.5 Rixton Clay Pits SAC, designated for great crested newts, is located 1.1km west of the land required for the Proposed Scheme and is immediately adjacent to a proposed construction traffic access road on the A57 Manchester Road. There would be no loss of habitat from the SAC and it is anticipated that any potential effects during construction would be controlled through measures in the draft CoCP, reducing the effects to a level that are not significant. It has been agreed with Natural England that no Habitats Regulations Assessment is necessary.

7.4.6 A study to inform the Habitats Regulations Screening Assessment was undertaken for Manchester Mosses SAC[63] for the Appraisal of Sustainability stage of project development. This was undertaken in consultation with Natural England and the Environment Agency. The findings concluded that there would be no potential for significant effects on the Risley Moss and Astley and Bedford Mosses components of the SAC. The Habitats Regulations Assessment (HRA) assumed the route would be on a viaduct as it passed Holcroft Moss and mitigation measures to avoid significant effects on the SAC were proposed for this option.

7.4.7 An addendum to the HRA was written in 2016[64] to consider additional information available regarding the Manchester Mosses SAC and the proposal for an embankment rather than a viaduct. It was concluded that impedance of water outflows (whether surface water or groundwater), caused by an embankment, could have a beneficial effect in reducing the drying-out of the Moss. However, as discussed in Section 15: Water resources, there is uncertainty regarding the direction of groundwater flows in the area. Further assessment will be undertaken to confirm the potential impact of the embankment on water levels and the resultant effect on Holcroft Moss. If required, the results of this assessment will be used in developing an appropriate design. Any studies to inform the required assessments will be completed and the outcomes agreed with Natural England prior to submission of the hybrid Bill.

[63] HS2 (2012). *HRA Screening Report for Manchester Mosses SAC*
[64] HS2 (2016) *Manchester Mosses Habitat Regulation Assessment (HRA) Screening Report*- Addendum 2016

7.4.8 HS2 Ltd will continue to consult Natural England and the Environment Agency (and other relevant key stakeholders) as the design develops to ensure that the submitted design in the hybrid Bill complies with the Habitats Regulations 2017. Where required, further assessment will be undertaken and an appropriate design will be developed through an iterative process. Impacts to this site are also addressed in Volume 2: Community area report MA05, Risley to Bamfurlong.

7.4.9 Rixton Clay Pits SSSI is located 1.1km west of the land required for the Proposed Scheme and is immediately adjacent to a proposed construction traffic access road on the A57 Manchester Road. There would be no loss of habitat from the SSSI. However, indirect effects from construction activities and traffic movements adjacent to the SSSI would result in a significant temporary adverse effect on the SSSI at a national level.

7.4.10 Holcroft Moss SSSI is located immediately adjacent to land that has been identified for the purpose of habitat creation or enhancement, as part of the Proposed Scheme. The ongoing consultation, further assessment and appropriate design in consideration to the Holcroft Moss component of the SAC to reduce the effects also apply to the SSSI. This is because the reasons for the designation and the potential effects would be the same for each of the site designations. Consequently, this would ensure that there would be no adverse effects on the integrity of the SSSI. Impacts on this site are also addressed in Volume 2: Community area report MA05, Risley to Bamfurlong.

7.4.11 Construction of the Proposed Scheme within the Broomedge to Glazebrook area would cause no significant adverse effect on Woolston Eyes SSSI. This is because the route does not cross the surface or groundwater catchment area associated within this site and it is located 2.7km from the land required for the Proposed Scheme.

7.4.12 Construction of the Proposed Scheme would result in the loss of 0.3ha (5%) of Fox Covert and Meadows SBI. The provision of new woodland creation (2ha) adjacent to the SBI would help to maintain the integrity of this SBI and connect the woodland to additional woodland creation provision along the River Bollin. A temporary adverse effect, significant at the county/metropolitan level on the SBI is expected until this woodland has established, after which the effect would be reduced to a level that is not significant.

7.4.13 Construction of the Manchester Ship Canal viaduct would result in the loss of 0.4ha (7%) of Coroner's Wood AWIS. The provision of new woodland creation adjacent to the AWIS (2.5ha) would help to reduce edge effects of the remaining AWIS and reduce the effects on the integrity of the remaining woodland. Ancient woodland is an irreplaceable resource and this loss is considered to be a permanent adverse residual effect.

### *Habitats*

#### Woodland

7.4.14 In addition to woodland within designated sites, construction of the Proposed Scheme would result in the loss of 1.7ha of broadleaved deciduous woodland from the Broomedge to Glazebrook area at Heatley, Mossbrow, Hollins Green, Glazebrook and

Glazebrook Moss. This would result in a permanent adverse effect that is significant at up to the district/borough level. It is considered that the aforementioned woodland habitat creation areas, which would connect remaining areas of woodland, would reduce the effect on broadleaved woodland to a level that is not significant, unless the ongoing review identifies any of the woodlands as ancient in which case there would be a permanent adverse effect at up to the county/metropolitan level.

### Grassland

7.4.15 Construction of the Proposed Scheme would result in the loss of grassland outside designated sites. In the absence of field survey information, it has been assumed that none of the grassland lost would be unimproved, and the adverse effect would therefore be significant at the district/borough level. It is considered that the provision of 3.7ha of newly created grassland would result in no significant effect on grassland.

### Hedgerows

7.4.16 The Proposed Scheme would cross hedgerows that are located throughout the area, some of which may be 'important' hedgerows. The land required for construction of the Proposed Scheme would result in the permanent loss of hedgerows, and would result in severance of the network in many places, adversely affecting connectivity with the surrounding area. The effects of these losses will be fully assessed in the formal ES. The Proposed Scheme includes new hedgerow planting, which would help compensate for losses. Further hedgerow planting will be proposed as part of the design development. In the absence of mitigation, on a precautionary basis, the loss of these hedgerows would result in a permanent adverse effect on the conservation status of the hedgerow network that would be significant at up to the district/borough level.

### Watercourses

7.4.17 The Proposed Scheme will cross the River Bollin and its tributary, the Old Bollin, an unnamed water course, Red Brook, the Manchester Ship Canal and an unnamed tributary of Glaze Brook on viaducts and the Bridgwater Canal on a bridge. These watercourses would not be directly affected and indirect effects would mostly be controlled through the implementation of measures in the draft CoCP, therefore there would be no significant effect on these watercourses. The Proposed Scheme would result in the loss of sections of various smaller watercourses and offline drains. On a precautionary basis, the loss and severance of sections of these watercourses due to culverts would result in a permanent effect that would be significant at up to the district/borough level.

### Water bodies

7.4.18 Six ponds located near to and north of Warburton would be lost as a result of the Proposed Scheme. One pond within the land required for the Proposed Scheme is within an area identified for habitat creation or enhancement and will not be lost. It is considered that the provision of new ponds would result in no significant effect on water bodies.

### Ancient and veteran trees

7.4.19 It is assumed that ancient and veteran trees within the land required for the Proposed Scheme in the Broomedge to Glazebrook area would be permanently lost. Ancient and veteran trees are an irreplaceable resource and on a precautionary basis their potential loss would result in a permanent adverse effect that is significant at district/borough level in each case.

## *Species*

### Bats

7.4.20 The permanent removal of vegetation in land required for the Proposed Scheme may have impacts on bats. Habitat loss would reduce the availability of foraging resource and potentially result in the loss of roosts and fragmentation of commuting routes. This could particularly affect breeding populations of 11 bat species potentially present 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 described in the draft CoCP. On a precautionary basis and in the absence of further survey information, it has been assumed that impacts would result in a permanent adverse effect on the conservation status of the bat populations that would be significant at up to the regional level.

### Otter

7.4.21 The River Bollin, its tributaries and the River Mersey, within the canalised section of the Manchester Ship Canal, have suitable habitats for otters. The proposed viaducts over the Manchester Ship Canal and the River Bollin would avoid loss of habitat along the river corridors. Indirect effects from construction activities may result in disturbance of this species during the construction period, and prevent them from moving along the watercourses. However, it is anticipated that these indirect effects would be controlled through measures in the draft CoCP. Culverting of smaller watercourses within the land required for the Proposed Scheme would result in habitat loss for this species, as well as potential loss of connectivity of commuting and foraging routes. On a precautionary basis and in the absence of further survey information, impacts to otters would result in an adverse effect on the conservation status of this species that would be significant up to the county/metropolitan level.

### Water vole

7.4.22 Water vole have been recorded at Manchester Ship Canal and Red Brook. Indirect effects from construction activities may result in disturbance to this species during the construction period and prevent them from moving along affected watercourses. However, it is anticipated that these indirect effects would be controlled through measures in the draft CoCP. The culverting of smaller watercourses within land required for the Proposed Scheme would result in habitat loss for this species. On a precautionary basis and in the absence of further survey information, impacts to water vole would result in an adverse effect on the conservation status of this species that would be significant up to the county/metropolitan level.

### Polecat

7.4.23 The loss of woodland and hedgerows along with grassland and arable land could affect polecat, a species which is recolonising Cheshire and Greater Manchester. On a precautionary basis and in the absence of survey information, the effects of permanent habitat loss on this species would be significant at up to the county/metropolitan level.

### Great crested newt

7.4.24 It has been assumed that six ponds (and surrounding terrestrial habitat) within the land required for the Proposed Scheme may support great crested newts and would be lost during construction. The loss of ponds supporting great crested newt could result in the isolation and severance of breeding populations of this species across this area. On a precautionary basis and in the absence of further survey information, it has been assumed that all ponds which would be lost support great crested newts. Where great crested newts are present, two new ponds will be created for each one lost to the permanent works and this would contribute towards reducing the effects to not significant. Additional ponds would also be required (also on a two to one basis), where other ponds would be lost outside the area of land required for the Proposed Scheme. Suitable terrestrial habitat would be required around all new ponds created along with links to encourage dispersal (e.g. by incorporating existing habitat or creating new habitat) and this would require further development. In the absence of the full mitigation, the loss of the ponds and surrounding land would result in a permanent adverse effect on the conservation status of great crested newts that would be significant at up to the county/metropolitan level.

### Birds

7.4.25 The Proposed Scheme would result in the loss of nesting and foraging habitat for a range of breeding and wintering birds, predominantly farmland and woodland species. These are likely to include barn owl, a Schedule 1[65] species. Suitable foraging habitat for barn owl is present within 500m of land required of the Proposed Scheme, including around Mossbrow and the Manchester Ship Canal. On a precautionary basis and in the absence of further survey information, it has been assumed that the Proposed Scheme would result in a permanent adverse effect that would be significant at up to the county/metropolitan level.

[65] Birds listed under Schedule 1 of the Wildlife and Countryside Act (1981) for which it is an offence to intentionally or recklessly disturb at, on or near an 'active' nest

### White-clawed crayfish

7.4.27 Suitable habitat for this species is expected to be present in watercourses in the Broomedge to Glazebrook area. The route of the Proposed Scheme would pass over most of these watercourses on viaducts and indirect impacts to the watercourses would be controlled through measures set out in the draft CoCP. Loss and severance of this habitat will occur where watercourses are placed into culverts or tunnels. On a precautionary basis and in the absence of survey information, it has been assumed that the Proposed Scheme would result in a permanent adverse effect that would be significant at up to the county/metropolitan level.

### Aquatic invertebrates

7.4.28 The land required for the Proposed Scheme would result in the loss of habitat suitable for aquatic invertebrates including species of principal importance as identified in Section 41 of the Natural Environment and Rural Communities (NERC) Act (2006)[66] (Section 41 species). On a precautionary basis and in the absence of survey information, it has been assumed that the Proposed Scheme would result in a permanent adverse effect that would be significant at up to the district/borough level.

### Terrestrial invertebrates

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

### Fish

7.4.30 Indirect impacts to the watercourses would be controlled through measures set out in the draft CoCP. However, where watercourses are directly affected and could support Annex II species such as European bullhead, and European eel and other Section 41 species and they may require assessment under the Water Framework Directive (WFD)[67].On a precautionary basis and in the absence of survey information, it has been assumed that the Proposed Scheme would result in a permanent adverse effect that would be significant at up to the district/borough level.

### Reptiles

7.4.31 Suitable habitat for common reptiles is likely to be present, including common lizard (recorded to the south of Holcroft Moss SSSI) in suitable grassland and scrub habitats. On a precautionary basis and in the absence of further survey information, it has been assumed that the land required for the Proposed Scheme would result in a permanent adverse effect that would be significant at up to the district/borough level.

7.4.32 Effects on other habitats and species that would be significant at the local/parish level during construction will be reported in the formal ES.

[66] Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006
[67] EU Water Framework Directive http://ec.europa.eu/environment/water/water-framework/index_en.html

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

## Other mitigation measures

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

- ancient woodland is an irreplaceable resource and this loss is considered to be a permanent adverse residual effect. The loss of ancient woodland would be partly compensated through a package of measures bespoke to the woodland affected. Ancient woodland soil with its associated seed bank would be salvaged and translocated to receptor sites that have, wherever possible, been chosen because they link to and/or are adjacent to ancient woodland fragments. This would seek to increase the connectivity of fragmented ancient woodland parcels. Other measures such as planting native tree and shrub species of local provenance, enhancement of retained woodland, and translocation of coppice stools and dead wood, would be undertaken as appropriate;
- options to reduce land required for the Proposed Scheme during construction within the AWIS and SBI sites through sensitive placement of works and access routes in the detailed construction design;
- river restoration and wetland habitat creation would help towards compensating for the loss of aquatic habitat;
- creation of grassland to replace that lost, and provide habitat for reptiles and terrestrial invertebrates;
- provision of additional hedgerows which would offset the losses and maintain the connectivity of the network;
- provision of additional measures to facilitate connectivity where significant foraging or commuting routes of fauna species would be affected;
- considering the need for inclusion of structures to reduce severance effects on bats;
- use of temporary fencing or retention of existing habitat links to reduce the risk of disturbance to otters during construction;
- design of watercourse culverts and underpasses to allow the free passage of wildlife;
- provision of alternative roosting habitat for bats; and
- provision of additional ponds (on a two to one basis where existing ponds supporting great crested newts are lost) outside the area required for the permanent works but within the land required for the Proposed Scheme and

suitable terrestrial habitat around these ponds with habitat links to allow dispersal.

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

## Summary of likely residual significant effects

7.4.36 Taking into account mitigation proposed in the design of the Proposed Scheme set out above, the anticipated significant residual ecological effects during construction are described in Table 9.

Table 9: Residual significant effects on ecological resources/features during construction

| Resource/feature | Residual effect | Level at which the effect would be significant |
|---|---|---|
| Rixton Clay Pits SSSI | Temporary adverse effect due to indirect effects from construction activities and traffic movements | National |
| Coroner's Wood AWIS | Permanent adverse effect due to 0.4ha (7%) of irreplaceable ancient woodland habitat loss | Up to county/metropolitan |
| Woodlands | Potential permanent adverse effect on unidentified ancient woodlands | Up to county/metropolitan |
| Hedgerows | Permanent adverse effect from loss of hedgerows and fragmentation of hedgerow network | Up to district/borough |
| Watercourses | Permanent adverse effect from loss and fragmentation of minor watercourses | Up to district/borough |
| Ancient and veteran trees | Permanent adverse effect from potential loss of ancient and veteran trees | Up to district/borough |
| Bats | Potential permanent adverse effect on conservation status due to loss of roosts, foraging habitat and fragmentation | Up to regional |
| Otter | Potential permanent adverse effect on conservation status due to loss and fragmentation of habitat along minor watercourses | Up to county/metropolitan |
| Water vole | Potential permanent adverse effect on conservation status due to loss and fragmentation of habitat along minor watercourses | Up to county/metropolitan |
| Polecat | Potential permanent adverse effect on conservation status due to loss of habitat | Up to county/metropolitan |

| Resource/feature | Residual effect | Level at which the effect would be significant |
|---|---|---|
| Great crested newt | Loss of six ponds and surrounding terrestrial habitat which may support great crested newt | Up to county/metropolitan |
| Breeding and wintering birds | Potential permanent adverse effect on conservation status due to loss of habitat | Up to county/metropolitan |
| White-clawed crayfish | Potential permanent adverse effect on conservation status due to loss of habitat and severance | Up to county/metropolitan |
| Aquatic invertebrates | Potential permanent adverse effect on conservation status due to loss of habitat | Up to district/borough |
| Terrestrial invertebrates | Potential permanent adverse effect on conservation status due to loss of habitat | Up to district/borough |
| Fish | Potential permanent adverse effect on conservation status due to loss of habitat along minor watercourses | Up to district/borough |
| Reptiles | Potential permanent adverse effect on conservation status due to loss of habitat | Up to district/borough |

## 7.5 Effects arising during operation

### Avoidance and mitigation measures

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

### Assessment of impacts and effects

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

7.5.3 Bats are at risk of being struck by trains or possibly harmed by turbulence, particularly at frequently used commuting/foraging routes which cross the Proposed Scheme. This represents a potential permanent adverse effect on conservation status of the bat species concerned that would be significant at up to the regional level.

7.5.4 Barn owls are at risk of colliding with trains, particularly where there is suitable grassland foraging habitat. The grassland vegetation that would grow along the embankments of the Proposed Scheme may encourage barn owls to forage close to trains, with the risk that they may be killed. Mortality, even if infrequent, could affect the conservation status of this Schedule 1 species and the ongoing reduction in numbers would result in a permanent adverse effect that would also be significant at up to county/metropolitan level.

7.5.5 Effects on other habitats and species that would be significant at the local/parish level during operation will be reported in the formal ES.

## Other mitigation measures

7.5.6 Additional mitigation measures currently being considered include:

- updating the HS2 barn owl mitigation plan[68] which is being developed to provide measures that will be implemented to reduce the effects of the Proposed Scheme to a level that is not significant. This is likely to include seeking opportunities to provide barn owl nest boxes and where feasible habitat enhancement opportunities at least 3km from the Proposed Scheme in consultation with local landowners; and
- structures to reduce mortality to bats foraging in proximity to or attempting to cross the railway and to facilitate their safe passage when the Proposed Scheme is operational.

## Summary of likely residual significant effects

7.5.7 Taking into account mitigation included as part of the Proposed Scheme design, the anticipated significant residual ecological effects during operation are detailed in Table 10.

Table 10: Residual significant effects on ecological resources/features during operation

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

## Monitoring

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

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

[68] Currently in development for Phase One of HS2

# 8 Health

## 8.1 Introduction

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

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

8.1.3 This section deals specifically with impacts and effects at a local level within the Broomedge to Glazebrook area. Health effects across the Proposed Scheme as a whole are assessed in the route-wide health assessment contained in Volume 3, Route-wide effects.

8.1.4 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme are provided in the Volume 2: MA04 Map Book.

## 8.2 Scope, assumptions and limitations

8.2.1 The scope, assumptions and limitations for the health assessment are set out in Volume 1 (Section 8) and the Scope and Methodology Report (SMR)[69].

8.2.2 As set out in the SMR, the health assessment is based on a broad understanding of health, consistent with the World Health Organization (WHO) definition of health as 'a state of complete physical, mental and social well-being and not merely an absence of disease or infirmity'. An individual's health is mostly determined by genetics and lifestyle factors, but for a large enough population many other factors, or 'health determinants', are known to be important, and these factors may be affected by the Proposed Scheme.

8.2.3 The assessment has considered the impacts of the Proposed Scheme on a range of environmental and socio-economic 'health determinants', which could result in adverse or beneficial effects on health and wellbeing.

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

8.2.4 The health determinants of relevance within the Broomedge to Glazebrook area are:

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

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

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

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

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

## 8.3 Environmental baseline

### Existing baseline

#### *Description of communities in the Broomedge to Glazebrook area*

8.3.1 The route of the Proposed Scheme would run from Broomedge in the south, passing close to the settlements of Broomedge, Little Heatley, Warburton, Partington, Hollins Green, Cadishead and Glazebrook in the north. The Broomedge to Glazebrook area is

predominantly rural in nature; the majority of community facilities are located in the larger settlements of Lymm, Partington and Cadishead.

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

### *Warburton, Partington and surrounds*

8.3.3 This area covers the settlements of Warburton, Partington and surrounds, from the southern boundary of the Broomedge to Glazebrook area to the Manchester Ship Canal to the north.

8.3.4 Warburton, a village with approximately 75 residential properties, is located to the west of the route of the Proposed Scheme. The nearest residential properties would be approximately 100m from the route of the Proposed Scheme.

8.3.5 Partington, which has approximately 3,400 residential properties, is located to the north east of the route of the Proposed Scheme. There are many facilities within Partington including schools, several care homes, a number of GP surgeries, Partington Children's Centre, recreational facilities such as the Partington Sports Village, and open spaces such as Coroners Wood. The village of Broomedge, which has approximately 230 residential properties, would be located to the south west of the route of the Proposed Scheme. The nearest residential properties would be approximately 850m from the route of the Proposed Scheme. Little Heatley – adjacent to Heatley – is a hamlet with nine residential properties and no community facilities. Some residential properties would be on the route of the Proposed Scheme. The village of Mossbrow is approximately 500m to the east of the route of the Proposed Scheme.

8.3.6 PRoW in the area include the Trans Pennine Trail, National Cycle Route 62, a predominantly traffic-free route which links Fleetwood (in Lancashire) with Selby (North Yorkshire) via the Trans Pennine Trail, the Cheshire Ring Canal Walk along the Bridgewater Canal towpath, the Mersey Valley Timberland Trail, and the Bollin Valley Way (a 40km walking route linking Macclesfield Riverside Park in Cheshire East with Partington) along the Manchester Ship Canal towpath.

### *Hollins Green, Cadishead, Glazebrook and surrounds*

8.3.7 This area covers the settlements of Hollins Green, Cadishead, Glazebrook and surrounds, from Manchester Ship Canal in the south to the northern boundary of the Broomedge to Glazebrook area.

8.3.8 The village of Hollins Green, which has approximately 400 residential properties and the nearest residential properties would be approximately 50m from the Proposed Scheme. Hollins Green has a small number of community facilities, comprising St Helen's Church of England Primary School, St Helen's Church, Hollinfare Cemetery, Rixton-with-Glazebrook Community Hall, a community shop, a post office, two public houses, and a recreation ground. Cadishead, a suburb of the City of Salford, is located north of the Manchester Ship Canal and north east of the route of the Proposed

Scheme. The village of Glazebrook, which has approximately 100 residential properties, is located to the east of the route of the Proposed Scheme.

8.3.9 PRoW in the area include the Glazebrook Timberland Trail, a long-distance walking route which links Pennington Flashes Country Park to the Manchester Ship Canal in Cadishead and the Leeds to Liverpool Canal.

### *Demographic and health profile of the Broomedge to Glazebrook area*

8.3.10 The local communities potentially affected by the Proposed Scheme in the Broomedge to Glazebrook area have a relatively low population density, commensurate with the rural nature of the area.

8.3.11 Data provided by the Office for National Statistics[70] show that this population has slightly poorer health status compared with the national (England) averages.

8.3.12 The population is more deprived than the national average with regard to the combined indices of multiple deprivation[71], and the health domain (a sub-set of the indices of multiple deprivation).

8.3.13 This area as a whole is considered to be less resilient than the national average, with regard to changes in the relevant health determinants, and with some vulnerabilities in terms of the health status of the population.

8.3.14 The available data provides detail down to ward level and enables a profile to be made of the population within the Broomedge to Glazebrook area. The description of the whole population, and the populations within wards, does not exclude the possibility that there will be some individuals or small groups of people who do not conform to the overall profile.

## 8.4 Effects arising during construction

### Avoidance and mitigation measures

8.4.1 Consideration of potential health issues is an integral part of the planning and design of the Proposed Scheme, alongside consideration of other environmental, community and economic issues. As far as reasonably practicable, mitigation measures have been incorporated into the design of the Proposed Scheme with the aim of avoiding or reducing adverse effects on people. Examples of the mitigation measures incorporated into the design of the Proposed Scheme include the following:

- reducing the loss of property and community assets, insofar as reasonably practicable;
- reducing visual intrusion and noise, insofar as reasonably practicable;
- incorporating landscape design and screening into the design; and

[70] The Office for National Statistics (ONS) provides spatial data on levels of deprivation, using indicators of: 'multiple deprivation', 'employment', 'education', 'barriers to housing and social services', 'crime' and 'living environment'. These data are available by Lower Super Output area
[71] Department for Communities and Local Government (2015) English Indices of Deprivation 2015. Available online at: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015

- permanent realignment and diversions of a number of public rights of way (PRoW) and roads to maintain access (see Section 14, Traffic and transport for further detail).

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

8.4.3 HS2 Ltd would require its contractors to comply with the environmental management regime for the Proposed Scheme, which would include the measures set out in the draft Code of Construction Practice (CoCP)[72], which provides a general basis for route-wide construction environmental management. Contractors would also be required to comply with the measures in Local Environmental Management Plans (LEMP), which apply the environmental management strategies at a local level.

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

8.4.5 The CoCP will require the nominated undertaker and its contractors to: produce and implement a community engagement framework and provide appropriately experienced community relations personnel to implement the framework; provide appropriate information; and to be the first point of contact to resolve community issues. The nominated undertaker would be required to take reasonable steps to engage with the community, focusing on those who may be affected by construction impacts, including local residents, businesses, landowners and community resources, while taking into account the specific needs of protected groups (as defined in the Equality Act 2010).

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

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

## Assessment of impacts and effects

### *Neighbourhood quality*

8.4.7 The term 'neighbourhood quality' is used in this assessment to describe the combination of environmental factors that influence people's experience of, and feelings about, their local environment. When these factors are altered people's levels

[72] Supporting document: Draft Code of Construction Practice

of satisfaction with their living environment may change. In turn, this could affect mental wellbeing or behaviours such as the use of outside space.

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

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

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

8.4.11 Dust emissions from construction activities are considered in Section 5, Air quality, which identifies no significant adverse effects with respect to the effects of construction activities on dust soiling and human health within the Broomedge to Glazebrook area, taking account of mitigation measures contained in the draft CoCP. Therefore, it is not expected that dust emissions around construction sites would contribute to adverse impacts on neighbourhood quality.

8.4.12 The construction of the Proposed Scheme would have temporary and permanent[73] impacts on neighbourhood quality in areas close to construction sites, including those at Heatley, Mossbrow, Warburton, Partington, Hollins Green and Glazebrook. Impacts on neighbourhood quality have the potential to affect the wellbeing of residents adversely during the construction phase, by giving rise to negative feelings in relation to quality of life and the local environment, and potentially changing behaviours, such as deterring the use of outdoor space.

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

[73] The SMR defines temporary changes (impacts) to health determinants as short term (<six months), medium term (six months – two years), and long term (two years +). Permanent impacts have not been defined in the SMR. A change in a health determinant lasting four years or more will be considered as a permanent impact. A professional judgement will be made as to when an impact would lead to a permanent effect on the health of the population.

potential to contribute to impacts on neighbourhood quality. This will be assessed in the formal ES.

8.4.14 Traffic and transport impacts in the Broomedge to Glazebrook area would include:

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

8.4.15 Construction traffic, including heavy goods vehicles (HGV), would be present on a number of roads in this area, as listed in Section 14, Traffic and transport.

8.4.16 Overall, it is considered that the construction of the Proposed Scheme has the potential to affect wellbeing through changes to neighbourhood quality. This will be assessed in the formal ES.

### *Access to services, health and social care*

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

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

### *Access to green space, recreation and physical activity*

8.4.19 There is moderate evidence to show that access to green space contributes to good mental health. There is also moderate evidence that environmental factors such as access to high quality green space, safety and local amenity, can influence participation in physical activity. Physical activity is strongly linked to health outcomes.

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

- impacts on PRoW, including temporary closures, diversions and loss of amenity, which may deter the use of these routes by walkers, cyclists and equestrians;

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

8.4.21 It is currently anticipated that the route of the Proposed Scheme would intersect a number of PRoW in the Broomedge to Glazebrook. The impacts on amenity and recreational value of these footpath networks, and therefore levels of physical activity and associated health and wellbeing benefits. This will be reported in the formal ES.

8.4.22 Construction traffic would mainly use site haul routes along the route of the Proposed Scheme. Some construction traffic, however, including HGVs, would be present on local roads. This could obstruct or deter pedestrians, cyclists and equestrians from using these routes.

### *Social capital*

8.4.23 The connections between individuals within communities, and the increased likelihood that arises through these networks for individuals to feel valued, to feel a sense of belonging, to have companionship and to support each other, is important for health and wellbeing. A measure of the effectiveness of these connections within communities is termed 'social capital' and is a recognised determinant of health. The Office for National Statistics defines social capital as follows:

'In general terms, social capital represents social connections and all the benefits they generate. Social capital is also associated with civic participation, civic-minded attitudes and values which are important for people to cooperate, such as tolerance or trust.'[74]

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

8.4.25 The villages along the route support small, well-established communities. The size of the temporary construction workforce may be substantial relative to the size of these local communities. During the day, the workforce would be present on construction sites and compounds throughout the area, including main compounds and satellite compounds in the vicinity of the settlements of Heatley, Mossbrow, Warburton, Partington, Hollins Green and Glazebrook. The duration of the works at each site ranges from approximately one year to approximately three years. The presence of construction workers is likely to be noticeable, with construction vehicles using local roads to access compounds and workers using facilities such as shops, restaurants and public houses within all local villages.

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

8.4.26 The introduction of a temporary construction workforce into communities has the potential to alter people's perceptions and interactions within their communities, modifying behaviour and the value they place on social capital. Such a reduction in social capital has the potential to adversely affect wellbeing, and may influence behaviours that are beneficial to wellbeing such as the use of community facilities.

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

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

8.4.29 The health assessment considers changes to the social environment and loss of social networks experienced by the remaining community following the loss of residential properties. For this to have an adverse impact on overall levels of social capital, the loss of homes would need to make up a sizeable proportion of the local community, with the potential to result in the direct loss of contacts in the local area and/or a noticeable reduction in the number of people using local facilities. This will be judged on a case-by-case basis, taking account of the size of the community and its characteristics. Therefore, not all of the significant effects identified in the Community section will result in adverse health and wellbeing effects.

8.4.30 One residential property would be demolished at Dam Head Lane on the outskirts of Rixton-with-Glazebrook. This loss does not represent a sizable proportion of the community and therefore no health effects are anticipated for the remaining community.

8.4.31 Land required for the Proposed Scheme would result in the demolition of four properties in the village of Little Heatley. The village of Little Heatley has a total of nine properties. The erosion of social networks resulting from these demolitions would have the potential to reduce social capital for the remaining community, reducing the beneficial health effects that are gained through social contact and support. Effects on residents directly impacted by demolitions are assessed in Volume 3, Section 7, Health.

8.4.32 Road closures and diversions required for the construction of the Proposed Scheme would have the potential to reduce community connectivity by increasing journey times between rural communities.

## Other mitigation measures

8.4.33 Any other mitigation identified to reduce adverse impacts on health determinants during the construction of the Proposed Scheme will be described in the formal ES.

8.4.34 HS2 Ltd will engage with local authorities and community representatives to identify measures aimed at fostering positive relationships between local communities and the temporary construction workforce. Any measures identified will be included within the Community Engagement Framework.

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

## 8.5 Effects arising from operation

### Avoidance and mitigation measures

8.5.1 Adverse impacts on health determinants would be reduced insofar as reasonably practicable through mitigation measures incorporated into the design of the Proposed Scheme to reduce adverse effects on people. The mitigation measures incorporated into the design of the Proposed Scheme in the Broomedge to Glazebrook area will be reported in the formal ES.

### Assessment of impacts and effects

#### *Neighbourhood quality*

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

### Other mitigation measures

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

### Monitoring

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

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

# 9 Historic environment

## 9.1 Introduction

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

9.1.2 Engagement has been undertaken with Historic England, Trafford Metropolitan Borough Council (TMBC) and Warrington Borough Council (WBC) local planning authority, Cheshire Archaeology Planning Advisory Service and Greater Manchester Archaeological Advisory Service. The purpose of this engagement has been to discuss the assessment approach, to obtain relevant baseline information and to inform the design development and assessment of the Proposed Scheme. Engagement will continue as part of the development of the Proposed Scheme and to inform the formal assessment.

9.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme are provided in the Volume 2: MA04 Map Book. Only designated heritage assets within the Broomedge to Glazebrook area are shown on maps CT-10-312b to CT-10-314a. Non-designated heritage assets have also been assessed as part of this work, although they are not illustrated on these maps.

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

9.1.5 Assets have been identified in this section of the report using their National Heritage List for England (NHLE) or Historic Environment Record (HER) name and number (numbers prefixed MGM). If no record number is known (e.g. an asset identified from historic mapping), then the asset is referred to by name. Project-specific asset identification numbers will be used for the formal ES.

## 9.2 Scope, assumptions and limitations

9.2.1 The scope, key assumptions and limitations for the historic environment assessment are set out in full in Volume 1 (Section 8) and the Scope and Methodology Report (SMR)[75], including the method for determining the value of a heritage asset and magnitude of impact (tables 19 and 20 in the SMR, respectively).

9.2.2 The assessment focuses on the extent to which the Proposed Scheme would affect designated and non-designated heritage assets. Impacts on assets as a result of the

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

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

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

9.2.4 The setting of all designated heritage assets within a study area of up to 2km from the land required for the Proposed Scheme has been considered. This is referred to in the remainder of this assessment as the 2km study area.

9.2.5 The historic environment methodology includes the consideration of the relevant intra-project effects. These interactions will be included in the assessment of impacts and effects in the formal ES.

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

9.2.7 The baseline studies informing this assessment have been drawn from a wide and comprehensive range of information sources. These will be supported by a programme of non-intrusive survey, including geophysical survey, the results of which will be reported in the formal ES.

9.2.8 At this stage of the design development, heritage assets within the land required to construct the Proposed Scheme are assumed to require complete removal and the assessment has been undertaken on that basis. However, an exception to this is the Bridgewater Canal, where although it is within the land required for the construction of the Proposed Scheme and may be affected, any effect is unlikely to be significant. With respect to overhead line diversions/realignments in particular, it is likely that the majority of the heritage assets can in fact be retained, as the land is only required to allow for raising or lowering of pylons and/or re-stringing of cables, or to provide an access route to the works.

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

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

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

- intra-project topic assessments are ongoing and will be considered as part of the assessment of historic environment effects as part of the formal ES.

## 9.3 Environmental baseline

### Existing baseline

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

- the NHLE (Historic England register of designated heritage assets);
- Greater Manchester and Cheshire HER;
- conservation area appraisals; and
- historic maps and aerial photography.

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

#### *Designated assets*

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

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

- Rixton Old Hall moated site, NHLE 1011147, Scheduled Monument of high value;
- Old Church of St Werburg, NHLE 1067865, Grade I Listed Building of high value;
- fifty nine Grade II listed buildings consisting of four associated with the Bridgewater Canal; the Church of St Peter in Lymm (NHLE 1265847); seven buildings within the Dunham Woodhouse Conservation Area; nine in the Warburton conservation area and a further ten on the periphery of Warburton village; 13 farmhouses and associated structures dotted across the landscape; eight 18th or 19th century halls or houses and associated structures; the Church of St Mary in Partington (NHLE 1389141) and adjacent stocks (NHLE 1067870); the Church of St Helen (NHLE 1391661) and two other assets in Hollins Green; a milestone (NHLE 1392446); and, Glazebrook Station (NHLE 1393556) all of moderate value; and
- two conservation areas– the Dunham Woodhouse Conservation Area and Warburton Conservation Area both of moderate value.

#### *Non-designated assets*

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

- the Bridgewater Canal;
- Burial mound, Warburton (HER MGM2929); and

- the Manchester Ship Canal.

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

- the Warrington and Stockport branch of the London and North Western railway line (now a Public Right of Way - the Trans-Pennine Trail and National Cycle Route 62);
- the site of a House and Garden on Bent Lane (HER MGM9101);
- Warburton Park (HER MGM562); and
- the site of a brick yard, east of Millbank Hall (HER MGM8952).

9.3.7 Non-designated heritage assets located partially or wholly within 500m of the land required, temporarily or permanently, for the construction and operation of the Proposed Scheme includes sixty six archaeological and built heritage assets of moderate and low value providing evidence for activity from the Roman period through to the post-medieval in Warburton including: farms, cottages and associated assets which reflect the rural landscape of the area; Hollins Green cemetery a locally listed cemetery of high value; and five locally listed buildings of low value within Hollins Green, including The Black Swan public house.

### *Historic Environment overview*

9.3.8 Evidence for prehistoric activity in the study area is scarce as it is across the region, with no recorded evidence from the Palaeolithic period. Where prehistoric evidence is found, it is concentrated on the glacial sand and gravel deposits, such as those to the west of Warburton, where flints of Neolithic or Bronze age date have been noted. A possible Bronze Age barrow has been recorded adjacent to Warburton Park Farm on similar geology. Iron Age settlement is noted with the presence of a promontory fort 300m west of Great Woolden Hall (NHLE1015127). The asset comprises a double-ditched enclosure encompassing a farmstead and several roundhouses of timber construction which is typical for this lowland zone. Pottery associated with the process of salt production was identified at the site and is indicative of trade with Cheshire, a centre for salt production. The circular form of the churchyard at the Church of St Helen at Hollins Green is likely to be of pre-Roman origin.

9.3.9 The Romano-British period began in Cheshire with the expansion of Roman occupation north of the midlands from AD70. A network of roads spread out across the North West from Chester, including Watling Street running from Chester to Northwich and on to the Roman fort of Mamucium (Manchester), which was founded in AD79. Excavations in Warburton, in the south of the study area, note the presence of Romano-British field systems, and the presence of a number of metalwork findspots consisting of bronze horse gear, five brooches, a silver bracelet and a small coin hoard, provides evidence for occupation in this period. The continuation of occupation into the Romano-British period at sites such as Great Woolden Hall, suggests that the Roman arrival had little effect on these rural settlements.

9.3.10 Archaeological evidence of the early medieval period is rare, and what is known of the period is largely from documentary sources. There is no early medieval archaeology recorded within the study area however, evidence of occupation is present on the fringes of the study area.

9.3.11 Ecclesiastical establishments and manorial centres were the major landholders during the medieval period. Agricultural land was poor and typically involved mixed subsistence farming which was common in the north of England. The village of Warburton, in the study area, has its origins in this period and the old church of St Werburg retains elements dating to the 12th century. An associated Norbertine[76] priory and the site of a mill are also of this date. The Hollins ferry crossed the Mersey from Warburton to Hollins Green and the original focus of settlement to the north of the river is also likely to be medieval in date.

9.3.12 In the post-medieval period the North West became a key region in the early stages of the industrialisation of Britain. Until the later 18th century agriculture provided employment for the majority of working people. Agrarian activity extended, and waste land, common land and other marginal areas were increasingly enclosed. The mosses, such as Glazebrook Moss within the study area, underwent great change as part of this process and nightsoil from Manchester was often added as fertiliser. The introduction of industry acted as a catalyst for improved transport links from the 18th century including the turnpiking of roads, such as the A57 in the study area, and the construction of the Bridgewater Canal which was completed in 1765. The Manchester Ship Canal is a dominant feature within the study area. It enabled Manchester to develop as an inland port and allowed for greater access to raw materials, such as cotton, and an increased number of outlets for its products. Constructed in 1894, it is closely associated with the route of the River Mersey. At Warburton, the curve of the River Mersey was bypassed and the river was canalised along this section. The original meander can still be seen at the back of the old Church of St Werburg and its adjacent rectory. The boundaries of Warburton parish and the county of Cheshire were moved northwards to the centre of the new Manchester Ship Canal.

9.3.13 During the late 19th century Warburton village went through a period of regeneration. The works were undertaken by Roland Egerton-Warburton, the estate owner, to the designs of the famous Chester architect John Douglas. Egerton-Warburton was responsible for the construction of a number of new buildings in the village, including the new Church of St Werburg (NHLE 1347816), and the renovation of other buildings. The Douglas style, heavily influenced by the Arts and Crafts movement, was adopted in other later restorations throughout the village, creating an element of consistency and cohesion in architectural styles.

9.3.14 The building of the Manchester Ship Canal transformed Partington, to the east of the Proposed Scheme, into a major coal exporting port. The growth of Partington continued into the 20th century, when the construction of a steel works was begun in 1910 by the Partington Iron and Steel Company. As the steel works grew, a wharf on

[76] The Norbertines, also known as the Order of Canons Regular of Premontre, are a religious order of Canons regular of the Catholic Church founded in Premontre in Laon in 1120 by Norbert of Xanten

the canal was built that allowed for ocean going ships to offload directly. The development of new roads and motorway links, by the mid-20th century, allowed people to live away from Manchester and led to the construction of large-scale housing development, such as at Birchwood. This increase in housing and infrastructure has made a particular impact on the areas around Birchwood, Cadishead and Partington. Despite the growth of Manchester and surrounding areas during the 20th century, the study area has witnessed little in the way of change remaining predominantly rural in nature.

## 9.4 Effects arising during construction

### Avoidance and mitigation measures

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

9.4.2 Section 8 of the draft Code of Construction Practice CoCP[77] sets out the measures that will be adopted, insofar as reasonably practicable, to control effects on heritage assets. These include:

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

### Assessment of impacts and effects

#### *Temporary effects*

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

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

9.4.5 The Church of St Werburg, Warburton, (NHLE 1347816), a Grade II listed building of moderate value, is located approximately 200m to the west of the land required for the Proposed Scheme. The church and adjacent Church House (NHLE 1067897) were constructed on the eastern edge of Warburton in the late 19th century to the design of John Douglas for Roland Egerton-Warburton, the estate owner. It was a replacement

[77] Supporting document: Draft Code of Construction Practice

for the Old Church of St Werburg (NHLE 1067865) located to the west of Warburton, with which it shares intervisibility. The location of the asset, immediately adjacent to Bent Lane, makes it a prominent feature when approaching the village from the east. The peaceful rural location adds to the sombre experience of the asset and the associated churchyard and Grade II listed war memorial (NHLE 1431681). The noise and movement associated with the construction activities, including construction traffic, of the Proposed Scheme would impact on the peaceful character of the setting. This would constitute a medium adverse impact resulting in a moderate adverse significance of effect.

9.4.6 The Church of St Helen (NHLE 1391661), Hollins Green, a Grade II listed building of moderate value is located approximately 80m from the land required for the Proposed Scheme. The asset is located on the northern edge of Hollins Green at the junction of Dam Lane and School Lane. Adjacent assets include a Grade II listed war memorial (NHLE 1392459), located within the expansive junction to the north, and a locally listed cemetery on the opposite side of Dam Lane. The asset derives much of its significance from its historical value as a representation of over 500 years of worship in Hollinfare and the setting contributes to this significance. The peaceful village location is representative of the parish that the church has historically served. The location of the Manchester Ship Canal Viaduct North main compound and the noise associated with the construction works would impact on the peaceful setting of the heritage asset. This would constitute a medium adverse impact and would result in moderate adverse significant effect.

9.4.7 The Cemetery at Hollins Green, is a non-designated, locally listed asset of high value. It is surrounded to the west, north and east by the land required for the Proposed Scheme. The cemetery opened in 1894, is still in use and has become a multi-denominational cemetery to reflect the diverse society of the area. The asset is located on the northern edge of the village and as such has a largely rural outlook and is relatively quiet due to a lack of passing traffic. Although much of the significance of the asset is derived from its historical value, the setting contributes by creating a peaceful rural outlook for contemplation, reflection and remembrance. The location of a Manchester Ship Canal Viaduct North main compound to the immediate north of the asset would introduce noise, light and movement that would impact on the peaceful nature of the setting. This would constitute a medium adverse impact and would result in major adverse significant effect.

### *Permanent effects*

9.4.8 Permanent significant effects can occur either as a result of physical impacts on heritage assets within the land required for the Proposed Scheme, or through changes to the setting of heritage assets through the presence of the Proposed Scheme.

9.4.9 The site of a post-medieval house and garden on Bent Lane (HER MGM9101), an asset of low value, would be removed due to its location within the land required for the Proposed Scheme. This would constitute a high adverse impact and result in a moderate adverse significant effect.

9.4.10 The site of a possible Bronze Age burial mound in Warburton Park (HER MGM2929), an asset of moderate value, would be physically impacted due to its location partially within the land required for the Proposed Scheme. This would constitute a medium adverse impact and result in a moderate adverse significant effect.

9.4.11 Warburton Park (HER MGM562), a post-medieval asset of low value, is located partially within the land required for the Proposed Scheme including MA04/06 Red Brook Flood Plain satellite compound, MA04/08 Manchester Ship Canal viaduct satellite compound and the construction of the Manchester Ship Canal viaduct. A considerable area of the former park would be physically impacted during construction. The Proposed Scheme bisects the park. This would constitute a high adverse impact and result in a moderate significant effect.

9.4.12 The site of a post-medieval brick yard, east of Millbank Hall (HER MGM8952), an asset of low value, would be removed due to its location within the land required for the Proposed Scheme. This would constitute a high adverse impact resulting in a moderate adverse impact.

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

9.4.14 The School (NHLE 1356531) and Post Office House (NHLE 1101758) at Warburton are Grade II listed buildings of moderate value. The assets are located approximately 200m and 90m respectively from the land required for the Proposed Scheme. The assets are a former school and post office to the east of Warburton village which were constructed during the late 19th century regeneration of the village. The works were undertaken by Roland Egerton-Warburton, the estate owner, to the designs of the famous Chester architect John Douglas. Egerton-Warburton was responsible for the construction of a number of new buildings in the village, including the new Church of St Werburg (NHLE 1347816). Although the assets derive some of their significance from their architectural and historical value due to their association with John Douglas, the setting also adds to the significance of the assets. The Douglas style, heavily influenced by the Arts and Crafts movement, was adopted in other later restorations throughout the village, creating an element of consistency within the village architecture. Although the assets are at some distance from the remainder of Warburton, the intervening area is characterised by agricultural fields. The fields highlight the rural agricultural nature of the village, which form a key part of its setting. The architectural style of the assets forms a cohesive link with both the new church and several other buildings within Warburton. The construction of the Proposed Scheme would create a physical division between the assets and Warburton village changing the ability to recognise the assets as a cohesive group with the remainder of Warburton. Additionally, the construction of the A6144 Paddock Lane realignment and the Bridgewater embankment would be visible in views out from the assets altering the rural agricultural outlook that is characteristic of the area. This would constitute a medium adverse impact and result in a moderate adverse significant effect.

9.4.15 Warburton conservation area is a moderate value asset located approximately 100m from the nearest land required for the Proposed Scheme. The asset derives much of

its significance from its setting as a rural village largely unchanged by the spread of industrial Manchester. Despite the proximity of Greater Manchester and the Manchester Ship Canal, the area has remained characteristically rural and agricultural, with many of the buildings within it reflecting this function. The conservation area appraisal notes that views out are across the surrounding flat fields and are of note for their long-distance range. The Proposed Scheme would impact on the setting of the conservation area. The land required for the Proposed Scheme would require the loss of the agricultural land that forms the setting, whilst the scale of the new infrastructure, including the Warburton embankment and the Manchester Ship Canal viaduct would foreshorten the long-range views out to the north-east, east and south-east, interrupting the long range views out across the surrounding fields. This would constitute a medium adverse impact and result in a moderate adverse significant effect.

### Other mitigation measures

9.4.16 No additional construction phase mitigation measures beyond those included within the Proposed Scheme design have been identified at this stage, however potential opportunities for further mitigation measures will continue to be considered through detailed design. These may include the identification of:

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

### Summary of likely residual significant effects

9.4.17 The temporary effects of construction activity on the setting of heritage assets have been considered. However, they are largely reversible in nature and would be restricted to the duration of the construction works.

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

## 9.5 Effects arising from operation

### Avoidance and mitigation measures

9.5.1 The following measures have been incorporated into the design of the Proposed Scheme, which would reduce the impacts and effects on heritage assets as shown on the CT-06 Map Series within the Volume 2: MA04 Map Book:

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

## Assessment of impacts and effects

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

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

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

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

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

- The School (NHLE 1347816);
- Post Office House (NHLE1101758); and,
- The Church of St Werburg (NHLE 1347816).

9.5.7 In relation to the following assets, the operation of the Proposed Scheme would result in additional effects that are significant and greater than the permanent effects of construction alone.

9.5.8 Warburton Conservation Area, an asset of moderate value, is located approximately 100m to the west of the land required for the Proposed Scheme (described above). The setting of the conservation area would be adversely affected by the operation of the Proposed Scheme. The additional train movement in key long-distance rural views from the conservation area and train noise would constitute a medium impact and moderate adverse effect. In combination with the impact of the presence of the Proposed Scheme on the setting of the assets (described in construction effects), the overall significance of effect would remain moderate adverse.

9.5.9 The Church of St Helen, Hollins Green (NHLE 1391661), a Grade II listed building of moderate value, is located approximately 80m to the west of the land required for the Proposed Scheme (described above). A key aspect of the asset's setting is its peacefulness and this would be adversely affected by the noise from the operation of the Proposed Scheme. The effects would be permanent and constitute a medium adverse impact and result in a moderate adverse significant effect.

9.5.10 The Cemetery, Hollins Green, a locally listed non-designated asset of high value is surrounded to the west, north and east by the land required for the Proposed Scheme (described above). The peaceful experience of the asset which contributes to its setting and significance would be adversely impacted by the train noise associated with the operation of the Proposed Scheme. The effects would be permanent and constitute a medium adverse impact and result in a major adverse significant effect.

## Other mitigation measures

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

## Summary of likely residual significant effects

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

## Monitoring

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

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

# 10 Land quality

## 10.1 Introduction

10.1.1 This section of the report presents the baseline conditions that exist along the Proposed Scheme in the Broomedge to Glazebrook area in relation to land quality, and reports the likely impacts and significant effects identified to date resulting from construction and operation of the Proposed Scheme. Consideration is given to land that potentially contains contamination and land that has special geological significance, either from a scientific, historical, mineral exploitation or mineral resources point of view including geological sites of special scientific interest (SSSI) and local geological sites (LGS), areas of historical mineral extraction and areas of designated mineral resources. Consideration is also given to petroleum (including gas) prospects and licensing.

10.1.2 Engagement has been undertaken with the British Geological Survey (BGS), The Coal Authority, Warrington Borough Council (WBC), Trafford Metropolitan Borough Council (TMBC), the Environment Agency, Fera Science Ltd (FSL)[78] and the Animal and Plant Health Agency (APHA). The purpose of this engagement has been to discuss the Proposed Scheme and potential effects, and obtain relevant baseline information. Engagement will continue as part of the development of the Proposed Scheme and to inform the formal assessment.

10.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2: MA04 Map Book.

10.1.4 Land contamination issues are closely linked with those involving water resources and waste. Issues regarding groundwater resources are addressed in Section 15, Water resources and flood risk. Issues regarding the disposal of waste materials, including contaminated soils, are addressed in Volume 3, Route-wide effects (Section 15).

## 10.2 Scope, assumptions and limitations

10.2.1 The scope, assumptions and limitations for the land quality assessment are set out in Volume 1, Section 8 and the Scope and Methodology Report (SMR)[79].

10.2.2 In accordance with the SMR, a risk-based approach was undertaken to identify contamination that may have an impact upon the construction of the Proposed Scheme. To support this, a desk-based assessment has been undertaken for the study area, defined as the land required for the construction of the Proposed Scheme. In the case of groundwater abstractions, this buffer is increased up to 1km.

10.2.3 The majority of new and diverted utilities would be laid in the boundaries of existing highways within normal road construction layers and natural soils below. These have been considered in the context of the conceptual site model (CSM) approach, and the

[78] Formerly known as the Food and Environment Research Agency
[79] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

lack of contact with nearby potentially contaminated sites, and the absence of sensitive receptors within the roadways reduces the risk of an impact occurring to very low levels. The impact of laying these new and diverted utilities has therefore been scoped out of the assessment as they are unlikely to cause any significant land quality effects.

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

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

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

10.2.7 The minerals assessment is based upon the mineral resources[80] identified on published minerals plans, and existing planning or licensed areas. Any inference of minerals provided by geological maps/reports is excluded (except where these are covered by the Minerals Plan).

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

## 10.3 Environmental baseline

### Existing baseline

10.3.1 Baseline data has been collected from a range of sources including Ordnance Survey mapping, the BGS, Coal Authority, WBC, TMBC, CRG, Public Health England (PHE), the Environment Agency, Natural England, Oil and Gas Authority, Fera Science Limited (FSL) and the APHA records, as well as web sources such as local geological trusts.

#### *Geology*

10.3.2 This section describes the underlying ground conditions within the Broomedge to Glazebrook area. Recent changes in lithostratigraphic classifications by the BGS have been incorporated where appropriate[81].

[80] Defined in the SMR as "mineral body including aggregates, salt, coal and other hydrocarbons, Petroleum Extraction Development Licences (PEDLs), Shale Prospective Areas (SPAs)".
[81] 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

10.3.3 Table 11 provides a summary of the geology (made ground, superficial and bedrock units) underlying the land required for the Proposed Scheme in the study area.

Table 11 : Summary of the geology underlying the underlying the land quality study area

| Geology | Distribution | Formation description | Aquifer classification |
|---|---|---|---|
| **Made ground** | | | |
| Made ground | 150m south of Mount Pleasant Farm to 40m north of Millbank Hall Farm<br><br>150m south west of Glazebrook to 10m north of Barracks (West) | Artificial ground comprising variable deposits of reworked natural and man-made materials | Not classified |
| **Superficial** | | | |
| Peat | Glazebrook Moss to the northern end of the route of the Proposed Scheme in the study area | Partially decomposed vegetation | Unproductive strata |
| Alluvium | Just south of the River Bollin to just south east of Fox Covert<br><br>Just south of unnamed watercourse (to the south of Manchester Ship Canal) to 100m south of A57 | Organic rich clay, silt, sand and gravel | Secondary A |
| River terrace deposits | Isolated patches on the south side of the valley of the River Bollin | Sand and gravel | Secondary A |
| Glaciofluvial sheet deposits | 100m south of Spring Lane to just south of the River Bollin<br><br>Just south east of Fox Covert to 180m south of Moss Brow Farm<br><br>Just south of Coroners Wood to just south of an unnamed surface watercourse (south of and connected to Manchester Ship Canal)<br><br>100m south of A57 to Dam Head Lane | Sand and gravel | Secondary A |
| Glacial till | The southern section of the route of the Proposed Scheme in the area to south of Lymm Road | Sandy silty clay with gravel | Secondary (Undifferentiated) |

| Geology | Distribution | Formation description | Aquifer classification |
|---|---|---|---|
| Shirdley Hill Sand Formation | South of Lymm Road to 100m north of Spring Lane<br><br>180m south of Moss Brow Farm to just south of Coroners Wood | Sand | Secondary A |
| **Bedrock** | | | |
| Northwich Halite Member - Mercia Mudstone Group | Just north of Lymm Road to north of the River Bollin | Halite stone and mudstone | Unproductive strata |
| Bollin Mudstone Member - Mercia Mudstone Group | North of the River Bollin to 200m south of the Manchester Ship Canal | Mudstone and siltstone | Secondary B |
| Tarporley Siltstone Formation - Mercia Mudstone Group | 200m south of the Manchester Ship Canal to Church Farm (at Glazebrook Moss) | Siltstone, mudstone and sandstone | Secondary B |
| Helsby Sandstone Formation - Sherwood Sandstone Group | The southern section of the Proposed Scheme in the area to just north of Lymm Road<br><br>Church Farm (at Glazebrook Moss) to the northern end of the route of the Proposed Scheme in the study area | Pebbly sandstone | Principal |

### Made ground

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

10.3.5 Artificial and worked ground is shown on BGS mapping as detailed within Table 11[82]. A cover of made ground is likely to be present across previously developed land within the study area.

10.3.6 No known farm burial or pyre sites associated with the 2001 outbreak of foot and mouth disease are known to be present within the Broomedge to Glazebrook study area. In all cases, records do not provide and exact location for the burial or pyre sites. However, older unrecorded sites may be present from the 1967 outbreak. Similarly, anthrax-infected cattle burials may be present, generally relating to burials over 50 to 100 years ago. However, no records have been found of such burials.

[82] BGS Geology 50k (DiGMapGB-50) sample data 1: 50 000 MapInfo® [Artificial Ground, Mass Movement deposits, Superficial deposits, Bedrock geology and Linear Features] (2017) online Available at: https://www.bgs.ac.uk/downloads/start.cfm?id=440

### Superficial geology

10.3.7 Alluvium variably comprising silty clay, silt, sand and gravel occurs along the courses of streams and rivers. Alluvium is present in the area associated with the River Bollin and the former alignment of the River Mersey, which has been canalised as the Manchester Ship Canal, around Heatley and Hollins Green, respectively.

10.3.8 An area of peat is located around Glazebrook Moss at the northern end of the study area.

10.3.9 Areas of river terrace deposits, comprising sand and gravel, are present in two isolated locations on the south side of the valley of the River Bollin.

10.3.10 Areas of glaciofluvial sheet deposits, comprising sand and gravel, are present intermittently along the route of the Proposed Scheme in the area around Heatley and Hollins Green.

10.3.11 Glacial till (Devensian)[83] deposits are located from the start of the study area (Agden Park Lane) to south of Lymm Road.

10.3.12 The Shirdley Hill Sand Formation, comprising sand, is present at two locations along the route of the Proposed Scheme within the study area. It is present firstly between Lymm Road and Spring Lane and then in the Warburton area, approximately between south of Moss Brow Farm and Coroners Wood.

### Bedrock geology

10.3.13 The formations and members of each bedrock geology group together with their locations along the route of the Proposed Scheme are as follows:

- the Helsby Sandstone Formation (part of the Sherwood Sandstone Group) comprises sandstone and is present from the start of the route of the Proposed Scheme in the area around Lymm (just north of the A56 Lymm Road) and again around Glazebrook Moss at the northern extent of the Proposed Scheme in the study area;
- the Northwich Halite Member (part of the Mercia Mudstone Group) comprises halite (rock salt) and mudstone and is present around Lymm and Heatley, from approximately just north of the A56 Lymm Road to the River Bollin;
- the Bollin Mudstone Member (part of the Mercia Mudstone Group) comprises mudstone and is present around Heatley and Warburton, approximately between the River Bollin and 200m south of the Manchester Ship Canal; and
- the Tarporley Siltstone Formation (part of the Mercia Mudstone Group) comprises siltstone and is present around Hollins Green and Glazebrook, approximately between 200m south of the Manchester Ship Canal and Glazebrook Moss.

[83] Glacial till is sometimes described as 'diamicton' in the BGS lexicon. This term relates to sediment deposited from land based erosion (such as from landslides and debris flows). In this case the term 'glacial till' refers to diamicton of glacial origin

10.3.14 A fault is located to the north-east of Lymm, running in a north-west to south-east orientation. The fault forms a divide between the Mercia Mudstone Group to the north and the Sherwood Sandstone Group to the south.

### Radon

10.3.15 Radon is a radioactive gas formed by the radioactive decay of naturally occurring uranium in rocks and soils. The occurrence of radon gas is shown in the BGS Radon Potential Dataset[84].

10.3.16 The formal ES will include an assessment of areas where there are 5% of homes estimated to have radon levels at or above 200Bq/m. The study area is located in a lower probability radon area with less than 1% of homes estimated to have radon levels at or above the action level of 200 becquerels per cubic metre of air (200Bq/$m^3$), as defined by Public Health England's UK Radon online map, therefore radon will not be considered further.

### *Groundwater*

10.3.17 Four categories of aquifer have been identified within the study area, as defined by the Environment Agency:

- the Sherwood Sandstone Group comprising the Helsby Sandstone Formation is designated as a Principal aquifer;
- river terrace deposits, alluvium, glaciofluvial deposits and Shirdley Hill Sand Formation are designated as Secondary A aquifers;
- the Mercia Mudstone Group underlying the majority of the study area, comprising the Bollin Mudstone Member and the Tarporley Siltstone Formation, has been designated as a Secondary B aquifer; and
- the glacial till is designated as a Secondary undifferentiated aquifer.

10.3.18 The Northwich Halite Member (part of the Mercia Mudstone Group) and peat are designated as unproductive strata.

10.3.19 The Environment Agency reports no licensed groundwater abstractions in the area.

10.3.20 The route of the Proposed Scheme intersects a Source Protection Zone (SPZ) 3 twice within the study area[85]. The first is located around Lymm and the second is located around Glazebrook. According to Environment Agency records, there are no drinking water safeguard zones for groundwater, within 1km of the study area, from Culcheth to east of the Golborne area.

10.3.21 Details of licensed abstractions are provided in Section 15, Water Resources and flood risk. It should be noted that all abstractions that are used directly or indirectly for human consumption are by default provided with SPZ. In such cases the abstraction

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

[85] Source protection areas – EA defined sources of drinking water, divided into inner, outer and total catchment areas; Zone 3 is the total catchment area defined as the area around a source within which all groundwater recharge is presumed to be discharged at the source

point qualifies for a default 10m radius SPZ1 and a default 250m radius for SPZ2. There is no default SPZ3 for total catchment with respect to this type of abstraction.

10.3.22 There are no private groundwater abstraction licences registered in the study area.

10.3.23 Further information on the groundwater in the Broomedge to Glazebrook area is provided in Section 15, Water Resources and flood risk.

### *Surface water*

10.3.24 The River Bollin and the Manchester Ship Canal are the most prominent surface water bodies within the study area. The route of the Proposed Scheme would intersect the River Bollin just north of Wet Gate Lane, around Heatley, and would intersect the Manchester Ship Canal just south of the A57, around Hollins Green. The tributaries of Glaze Brook are located within the study area. There are also a number of unnamed streams, drains and ponds located within the study area, some of which the land required for the Proposed Scheme would intersect.

10.3.25 The route of the Proposed Scheme would also intersect the Bridgewater Canal just north of Warrington Lane, around Broomedge. Red Brook, Glaze Brook and Marsh Brook also lie in the study area.

10.3.26 Surface water bodies in the Broomedge to Glazebrook area are described in more detail in Section 15, Water resources and flood risk. Further information of surface water abstractions is also provided in Section 15.

10.3.27 There are three licensed surface water abstractions located within the study area. These are for general agriculture uses (spray irrigation – direct). Records of private unlicensed surface water abstractions have been requested from the local authorities. There is no obligation to register private water supplies, therefore unregistered private surface water supplies may be present.

10.3.28 According to Environment Agency records, there are no drinking water safeguard zones for surface water within 1km of the study area.

### *Current and historical land use*

10.3.29 Current potentially contaminative land uses within the study area include eight industrial sites. The key potentially contaminative sites are: two active railway lines; a cemetery, a sewage works, two MOD barracks and rifle range.

10.3.30 Historical land uses identified within the study area with the potential to have caused contamination include: 11 industrial sites. Infilled pits and ponds may have been filled with a variety of waste materials, but have not been licensed. The key historical potentially contaminative sites are:

- Mineral Railway (Hollins Green);
- Cheshire Lines Railway;
- two historical landfill sites; and
- infilled pits.

10.3.31 Further details of these key current and historical contaminative land uses within the study area are shown in Table 12 and Table 13.

Table 12: Current and historical landfill sites located in the study area

| Name and Area Reference | Location | Description |
|---|---|---|
| Ollerton Developments Ltd., Hollins Green (MA04-45) | The historical landfill is located within land required for construction of the Proposed Scheme, north of the Manchester Ship Canal | Environment Agency records indicate that industrial waste was accepted at the landfill between 1st November 1989 and 31st July 1991. There is no information available pertaining to the licence name/number, although a surrender date of 30 April 1993 is noted. |
| Land adjacent to Lancashire Tar Distillers (MA04-48) | The historical landfill is located approximately 30m east of the land required for construction of the Proposed Scheme, 30m adjacent north of the Manchester Ship Canal | The Environment Agency does not hold information pertaining to the licensing of the landfill or the waste types accepted. |

Table 13: Current and historical industrial sites located in the study area

| Name and Area Reference | Location | Description |
|---|---|---|
| Mineral Railway, Hollins Green (MA04-42) | 140m north of Millbank Hall Farm and 85m south of Hollins Green. | Historical mineral railway crosses the route and is present on historical mapping from 1907-1979 |
| Cheshire Lines Railway (MA04-57) | 230m south west of Glazebrook and 190m north west of Glazebrook Barracks (west) | The current Cheshire Lines Railway crosses the route and has been present on mapping from approximately 1893 to the present day. |
| Sewage works (MA04-37, MA04-40) | 190m south east of Hollins Green | Former sewage works from 1966 to 1990, 1990 to current day water works |
| Glazebrook MOD barracks (MA04-54, MA04-55) | 500m south west and 500m south east of Glazebrook | Former MOD barracks shown on OS historical mapping from 1948 to 1970 |
| Rifle range (MA04-51) | 380m west of Mount Pleasant Farm | Present day rifle range intersects the study area, shown on OS historical mapping from 1949 to present |

10.3.32 Contaminants commonly associated with sites in Table 12 and Table 13 could include metals, semi-metals, asbestos, organic and inorganic compounds. Additionally, infilled pits and landfills could also give rise to landfill gases such as methane or carbon dioxide and leachate.

### *Other regulatory data*

10.3.33 The regulatory data reviewed included pollution incidents (major, significant and minor categories), radioactive and hazardous substances consents and environmental permits (previously landfill, integrated pollution control and integrated pollution prevention and control licences). There are no recorded major, significant or minor pollution incidents in the Broomedge to Glazebrook area.

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

10.3.35 The Environment Agency reports one consented discharge to groundwater within the study area. This is active and for multiple owners (domestic properties including farm houses) on Warrington Lane and is located approximately 100m east of land required for the Proposed Scheme. Further details on the groundwater and surface water in the area can be found in Section 15, Water resources and flood risk.

10.3.36 There are seven discharge consents to surface water within the study area, none of which are within the area of land required for the Proposed Scheme.

10.3.37 Holcroft Moss Site of Special Scientific Interest (SSSI) is located approximately 5m north-west of the study area. The SSSI is part of the Manchester Mosses Special Area of Conservation (SAC) and is designated for its degraded raised bog. The entire SSSI is located within the Risley to Bamfurlong area (MA05) and, as such is considered in the Volume 2: Community area report MA05, Risley to Bamfurlong.

### *Mining/mineral resources*

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

#### Minerals plans

10.3.39 WBC is responsible for the regulation of minerals and waste in the majority of the area. The WBC Local Plan Core Strategy[86] was adopted in July 2014, and Policy MP9 sets out the policies aimed at encouraging the efficient and sustainable use of mineral resources in order to enable the Council to plan for a steady and adequate supply of aggregates. A 'Minerals Resource Study and Policy Review'[87] was undertaken by Urban Vision on behalf of WBC in March 2017, the aim of which was to review the existing Local Plan to ensure a steady and adequate supply of minerals to meet future demand for minerals in the Plan area.

10.3.40 TMBC is responsible for the mineral and waste local plans for part of the area, around Heatley and Warburton. As Trafford Borough falls within the Greater Manchester area, it adopts the policies set out in the 'Greater Manchester Joint Minerals Plan'[88], which was implemented in April 2013. That document outlines how the various boroughs within Greater Manchester can plan for minerals in a sustainable manner. No further revisions of the plan have been published to date.

[86] Warrington Borough Council. Local Plan Core Strategy. July 2014. Available online at: https://www.warrington.gov.uk/info/200564/planning_policy/1903/local_plan
[87] Urban Vision. Warrington Borough Council Minerals Resource Study and Policy Review. March 2017.Available online at:https://www.warrington.gov.uk/info/201368/local_plan_review/2347/local_plan_review_-_supporting_documents
[88] Greater Manchester Joint Minerals Plan. March 2017. Available online: https://www.trafford.gov.uk/planning/strategic-planning/local-plan/greater-manchester-joint-minerals-development-plan-document.aspx

### Sand and gravel deposits

10.3.41 River deposits (sands and gravels) are recorded as mineral resources in the area, although no quarries are recorded in the vicinity of land required for the Proposed Scheme.

10.3.42 The route of the Proposed Scheme intersects three mineral safeguarding areas (MSA) for sand and gravel in the area. The first is at the southern extent of the study area around Lymm. The second is in the central area of the study area around Heatley and the Manchester Ship Canal. The third is further north of the study area around Hollinfare.

### Peat

10.3.43 The Minerals Resource Study and Policy Review indicates that generally, current mineral activity in the Warrington area is limited. Peat is recorded as a resource at the very north of the area, although no mines or quarries are recorded in the vicinity of land required for the Proposed Scheme.

### Salt deposits

10.3.44 Salt is not currently exploited in the study area, despite salt resources being located in the west of the area and within the Northwich Halite Formation.

10.3.45 The study area is located in a brine compensation area, administered by the Cheshire Brine Compensation Board[89].

### Coal mining

10.3.46 Available records from the Coal Authority show that the route of the Proposed Scheme would not run through areas of recorded historical underground coal mining activities. Deep coal (associated with the South Lancashire Coalfield and located at more than 1200m below ground level) is recorded as a mineral resource in the area, although no mines are recorded in the vicinity of the Proposed Scheme in the Broomedge to Glazebrook area.

### Petroleum Exploration and Development Licences (PEDLs)/Hydrocarbons

10.3.47 The OGA indicates that the route of the Proposed Scheme passes through five petroleum exploration and development licences (PEDL) in Warrington Borough. These contain wells for shale gas. However, none of the wells are located in the study area, and therefore do not require further assessment.

## *Geo-conservation resources*

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

[89] A brine compensation area is an area with the potential to undergo subsidence due to the pumping of brine, and where there are compensation schemes in place to compensate for damaged caused by such subsidence. This brine compensation area is relevant to study are due to the potential for damage to structures and/or infrastructure from subsidence or change in ground conditions caused by brine pumping.

### *Receptors*

10.3.49 The sensitive receptors that have been identified within the study area are summarised in Table 14. A definition of receptor sensitivity is given in the SMR.

Table 14: Summary of sensitive receptors

| Issue | Receptor type | Receptor description | Receptor sensitivity |
|---|---|---|---|
| Land contamination | People | Residents at existing properties, schools and study centres | High |
| | | Workers at and visitors to farms and commercial properties | Moderate |
| | | Workers and visitors to industrial sites | Low |
| | Groundwater | Principal bedrock aquifers | High |
| | | Secondary A superficial aquifers | Moderate |
| | | Secondary B bedrock aquifers<br>Secondary (Undifferentiated) superficial aquifers | Low |
| | Surface waters | Manchester Ship Canal, River Bollin, Bridgewater Canal | Very high |
| | | Red Brook | High |
| | | Glaze Brook, and Moss Brook, | Low |
| | Ecological designations | Holcroft Bog SSSI | Moderate |
| | Built environment | Underground structures and buried services | Low |
| Impacts on mining/mineral and petroleum (gas) sites (severance and sterilisation) | Mining/mineral sites | Sand and gravel mineral safeguarding area Sand and gravel and peat resources, PEDLs | Moderate |

## 10.4 Effects arising during construction

### Avoidance and mitigation measures

10.4.1 The construction assessment takes into account the mitigation measures described in the draft Code of Construction Practice (CoCP)[90]. The draft CoCP sets out the measures and standards of work that would be applied to the construction of the Proposed Scheme and includes requirements to ensure the effective management and control of work in contaminated areas.

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

[90] Supporting document: Draft Code of Construction Practice

- methods to control noise, waste, dust, odour, gases and vapours (Sections 5, 7, 11,13, 14 and 15);
- methods to control spillage and prevent contamination of adjacent areas (Sections 5, 11 and 16);
- the management of human exposure for both construction workers and people living and working nearby (Sections 5, 7, 11, 13, and 14);
- methods for the storage and handling of excavated materials (both contaminated and uncontaminated) (Sections 6, 7, 11 and 15);
- management of any unexpected contamination found during construction (Sections 11 and 15);
- a post-remediation permit to work system (Section 11);
- storage requirements for hazardous substances such as oil (Sections 5, 11 and 16);
- traffic management to ensure that there is a network of designated site haul routes to reduce compaction/degradation of soils (Sections 5, 6 and 14);
- methods to monitor and manage flood risk and other extreme weather events which may affect land quality during construction (Sections 5 and 16); and
- methods to manage discovery of unknown animal burial pits (Section 6).

10.4.3 The draft CoCP would require that prior to and during construction, a programme of further detailed investigations, which may include both desk based and site based work, takes place in order to confirm the full extent of areas of contamination. It also requires a risk assessment to be undertaken to determine what, if any, site specific remediation measures are required to allow the Proposed Scheme to be constructed safely and to prevent harmful future migration of contaminants. The investigation and assessment of potentially contaminated sites would be undertaken in accordance with Environment Agency CLR11[91] and British Standards BS10175[92] and BS8576[93].

10.4.4 Where significant contamination is encountered, a remedial options appraisal would be undertaken to define the most appropriate remediation techniques. Where appropriate, this appraisal would be undertaken based on multi-criteria attribute analysis that considers environmental, resource, social and economic factors in line with the framework set out by the Sustainable Remediation Forum UK[94].
The preferred option would then be developed into a remediation strategy.

10.4.5 Contaminated soils excavated within the site, where practicable, would be treated to remove or render contamination inactive and reused within the Proposed Scheme where needed and suitable for use. Treatment techniques are likely to include

[91] Environment Agency, (2004), *CLR11 Model Procedures for the Management of Land Contamination*
[92] British Standard, (2017), *BS10175:2011+A2:2017 Investigation of Potentially Contaminated Sites*
[93] British Standard, (2013) *BS8576 Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)*
[94] +Sustainable Remediation Forum UK, (2010), *A Framework for Assessing the Sustainability of Soil and Groundwater Remediation*

stabilisation, soil washing and bio-remediation. Contaminated soil removed off-site would be taken to a soil treatment facility, another construction site (for treatment and reuse) or to an appropriately permitted landfill.

## Assessment of impacts and effects

10.4.6 Construction of the Proposed Scheme in this area would require earthworks, utility diversions, deep foundations, grouting, ground stabilisation and other activities, including the construction of the various viaducts and road infrastructure works. These aspects of the Proposed Scheme, along with other construction features, are shown on the Map Series CT-05 in the Volume 2: MA04 Map Book.

### *Land contamination*

10.4.7 In line with the assessment methodology, as set out in the SMR, an initial screening process has been undertaken to identify areas of current or historical contaminative use within the study area and to consider which of these areas might pose contaminative risks for the Proposed Scheme. Sites that present a low risk have not been taken further in the assessment. Any moderate to higher risk sites have been taken forward to more detailed risk assessments, in which the potential risks are assessed more fully. The majority of the areas that have undergone the more detailed risk assessments are historical or current landfills and industrial, commercial and mining sites.

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

- whether the site is located on or off the route of the Proposed Scheme or associated off line works;
- the vertical profile of the route;
- the presence of underlying sensitive groundwater aquifers (Principal or Secondary A) or nearby watercourses; and
- the presence of adjacent residential properties or sensitive ecological receptors.

10.4.9 Clusters of potentially contaminated sites of a similar nature have been grouped, and assessed together, where appropriate.

10.4.10 A simple summary of the baseline CSM is provided in Table 15. The potential impacts and baseline risks quoted are those before any mitigation is applied. The assessed baseline risk is based on the information provided at the time of the assessment. Where limited information is available, the assessment is based on precautionary, worst case assumptions and may therefore report a higher risk than that which actually exists. A screening assessment of the effects of contamination has been completed by comparing the detailed CSM developed for potential contaminated areas at baseline with construction and post-construction stages. Developed for potential contaminated areas at baseline with construction and post-construction stages.

Table 15: Summary of baseline CSM for key sites which may pose a contaminative risk for the study area

| Area reference[95] | Area name | Human health risk | Ground water risk | Surface water risk | Ecosystem risk | Buildings risk |
|---|---|---|---|---|---|---|
| On site[96] | | | | | | |
| MA04-47 | Hollinfare Cemetery | Moderate/low to Moderate | Low | Very low | N/A[97] | Low to very low |
| MA04-21, MA04-31, MA04-50 | Jackhaygate Farm, Mossbrow Farm, Mount Pleasant Farm | Very low to Moderate | Low | Very low | N/A | Low to very low |
| MA04-23, MA04-43, MA04-45 | Historic landfill (Hollins Green, and land adjacent to Tar Distillery) and infilled pits | Very low to Moderate | Moderate | Very low | N/A | Low to very low |
| MA04-03, MA04-15, MA04-16, MA04-19, MA04-28 | Marsh and peat land (potential source of ground gas)[98] | Moderate/low | N/A | N/A | N/A | Low |
| MA04-51, MA04-54, MA04-55 | MOD barracks and rifle range | Low to moderate | Moderate/low | Low | N/A | Low to very low |
| MA04-17, MA04-42, MA04-57, MA04-58, MA04-61 | Railway land | Very low to Moderate/low | Low | Moderate/low | N/A | Low to very low |
| MA04-40 | Sewage works in west Partington | Very low to Moderate/low | Low | Very low | N/A | Low to very low |
| Off site[99] | | | | | | |
| MA04-38, MA04-44, MA04-46 | Works (former Smithys) – West of Manchester | Very low to Moderate/low | Low | Very low | N/A | Low to very low |

[95] Each potentially contaminated site is allocated a unique reference number
[96] 'On site' is within the area of land required for construction of the Proposed Scheme
[97] N/A refers to no receptor being present
[98] For on and off site march and peat land it is considered there is no risk to ground or surface water, therefore shown as N/A
[99] 'Off site' is beyond the land required for construction of the Proposed Scheme but within 250m of it

| Area reference[95] | Area name | Human health risk | Ground water risk | Surface water risk | Ecosystem risk | Buildings risk |
|---|---|---|---|---|---|---|
| | Road; South of the Weint and South west of Moss Side Lane – all in Hollins Green | | | | | |
| MA04-22 | Overtown Farms, Warburton | Low to Moderate/low | Low | Very low | N/A | Low to very low |
| MA04-25, MA04-26, MA04-27, MA04-48, MA04-56 | Landfill and infilled pits (three north of Overtown farm, Warburton; Land adjacent to Tar Distillery and Former sand pit west Cadishead) | Very low to Moderate/low | Moderate | Very low | N/A | Low to very low |
| MA04-37 | Sewage works | Very low to Moderate/low | Moderate | Very low | N/A | Low to very low |
| MA04-39 | Tank associated with Millbank Hall Farm (presumed for fuel storage) | Very low to Moderate/low | Low | Very low | N/A | Low to very low |
| MA04-29 | Marshland | Low | N/A | N/A | N/A | Very low |

## Temporary effects

10.4.11 In order to identify potential temporary effects, the baseline and construction CSM have been compared to determine the change in level of risk at receptors during the construction stage, and thus to define the level of effect at the construction stage.

10.4.12 Where there is no change between the main baseline risk and the main construction risk, the temporary effect significance is deemed to be negligible even if the risk is deemed to be high. For example, this would be the case where the construction of the Proposed Scheme does not alter the risks from an existing potentially contaminated site that is outside the area required for construction.

10.4.13 A worsening risk at construction stage compared to baseline would result in a negative effect, and conversely, an improvement would result in a positive effect. The assessment assumes that contamination would be controlled through the general measures in the draft CoCP. All of the sites set out in Table 15 were found to have non-significant (neutral or minor beneficial) effects.

10.4.14 In the event that unexpected contamination is encountered during the construction of the route in this area, this would be remediated as described in the draft CoCP resulting in an overall beneficial effect.

10.4.15 Construction compounds located in this study area would include the storage of potentially hazardous substances, such as fuels and lubricating oils and may also be used for temporary storage of potentially contaminated soils. Mitigation measures set out within the draft CoCP include management of risks from the storage of such materials resulting in no significant effects.

#### Permanent effects

10.4.16 In order to identify potential permanent effects, a screening assessment has been undertaken comparing the baseline and post-construction CSM to assess the permanent (post-construction) effects.

10.4.17 Construction compounds located in this study area would include the storage of potentially hazardous substances, such as fuels and lubricating oils and may also be used for temporary storage of potentially contaminated soils. Mitigation measures set out within the draft CoCP include management of risks from the storage of such materials.

10.4.18 All of the sites set out in Table 6 have been assessed for the change in impact associated with the permanent post construction stage. All of the sites referenced in Table 6 were found to have non-significant (neutral or minor beneficial) effects.

10.4.19 Additional site-specific permanent remediation measures, that could focus on source removal, pathway breakage or receptor protection, would be developed during the detailed design stage if required. These measures would ensure that risks to people and property from gas and vapours in the ground, the principal risk in this area, would be controlled to an acceptable level.

### *Mining/mineral resources*

10.4.20 Construction of the Proposed Scheme has the potential to affect existing mineral resources, 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[100] or isolation that may occur during the construction phase of the Proposed Scheme, possibly continuing through to its operation.

[100] 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

10.4.21 The route of the Proposed Scheme would cross three MSAs for sand and gravels between Lymm and Hollinfare.

### Temporary effects

10.4.22 There are no coal, clay or currently exploited salt resources in the study area and so no temporary effects from the construction of the Proposed Scheme on these resources would occur.

*Sand and gravel deposits*

10.4.23 Temporary adverse effects may occur where construction compounds are proposed within MSAs. In such cases, there would be a temporary sterilisation of the resource during construction works, but this is not considered to represent a significant effect and the resource would not be lost permanently.

10.4.24 The following compounds fall within the MSA:

- Manchester Ship Canal viaduct south satellite compound; and
- River Bollin viaduct satellite compound.

*Petroleum Exploration and Development Licences (PEDLs)*

10.4.25 Any effects from the construction of the Proposed Scheme on the identified PEDLs would be negligible as it is unlikely that construction works would place a constraint on future exploitation of potential sources of shale gas or other forms of hydrocarbon resource given the extent of the PEDL area.

### Permanent effects

10.4.26 The majority of effects on mineral sites would be permanent. There are no coal, clay or salt resources in the study area and so no permanent effects from the construction of the Proposed Scheme on these resources would occur.

*Sand and gravel deposits*

10.4.27 The effects of construction works on the sand and gravel MSAs would be permanent where underlain by the footprint of the permanent works, with a strip of mineral becoming sterilised. However, as a proportion of the total mineral site, the strips account for less than 5% of the total area of the MSAs and is therefore considered to be minor and not significant. Mitigation measures (if any) would be discussed with relevant parties in advance of commencement the works.

*Petroleum Exploration and Development Licences (PEDLs)*

10.4.28 The effects of the Proposed Scheme on the identified PEDLs would be negligible as it is unlikely that construction of the Proposed Scheme would place a constraint on future exploitation of potential sources of shale gas or other forms of hydrocarbon resource.

10.4.29 Table 16 reports the assessment of permanent effects from construction on the mining and mineral resources identified.

Table 16: Summary of effects for mining and mineral resources

| Site name | Status | Description | Sensitivity/ value | Magnitude of impact | Effect and significance (Y/N) |
|---|---|---|---|---|---|
| River deposits (sand and gravel) | Mineral site<br><br>MSA | River deposits (sand and gravel) | Medium | Minor | Negligible effect<br><br>(N) |
| PEDL 193, PEDL296 | PEDL | Petroleum exploration and development licence areas | Medium | Negligible | Negligible effect<br><br>(N) |

10.4.30 The significance of effects on the mineral resources located in the study area are considered to be negligible.

### *Geo-conservation sites*

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

### Other mitigation measures

10.4.32 At this stage, no additional measures are considered necessary to mitigate risks from land contamination during the construction stage beyond those that are set out in the draft CoCP and/or instigated as part of the site-specific remediation strategies that would be developed at the detailed design stage if required. These measures would ensure that risks to people and property from contaminants in the ground would be controlled such that they would not be significant. For example, measures might include excavation and treatment of contaminated soils or controls to manage movement of landfill gas and leachate.

10.4.33 Mitigation of the effects on mineral resources could include extraction of the resource in landscaping areas within the Proposed Scheme adjacent to, rather than beneath the structural footprint of the Proposed Scheme, which would require good founding conditions. A plan would be discussed in advance of the construction works with the landowner, the mineral planning departments at WBC and TMBC, and any other relevant parties to assist in achieving an effective management of minerals within the affected locations.

### Summary of likely residual significant effects

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

## 10.5 Effects arising from operation

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

## Avoidance and mitigation measures

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

## Assessment of impacts and effects

10.5.3 The Proposed Scheme within this area would include two auto-transformer stations: Wet Gate Lane auto-transformer station and Glazebrook auto-transformer station off Dam Head Lane. An auto-transformer station, feeder stations and sub-stations can, in principle, be a source of contamination through accidental discharge or leaks of coolant. However, in common with other modern sub-stations, secondary containment appropriate to the level of risk would be included in the installed design.

10.5.4 The operation of the trains may give rise to minor contamination through leakage of hydraulic or lubricating oils. However, such leakage or spillage is expected to be very small and unlikely to result in significant contamination.

## Other mitigation measures

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

## Summary of likely residual significant effects

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

## Monitoring

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

# 11 Landscape and visual

## 11.1 Introduction

11.1.1 This section of the report presents the assessment of the likely significant landscape and visual effects identified to date within the Broomedge to Glazebrook area. It summarises the baseline conditions found within and around the route of the Proposed Scheme and describes the likely impacts and significant effects during construction and operation on landscape and visual receptors.

11.1.2 The operational assessment section refers not just to the running of the trains, vehicles on roads and any associated lighting but also the presence of the new permanent infrastructure associated with the Proposed Scheme.

11.1.3 Engagement with Warrington Borough Council (WBC) and Trafford Metropolitan Borough Council (TMBC) has commenced. The purpose of this engagement has been to discuss the assessment methodology, extent of the landscape and visual study area, and the locations of visual assessment and verifiable photomontage viewpoints. Engagement will continue as part of the development of the Proposed Scheme and to inform the formal assessment. The viewpoints identified in this report are provisional and will be further discussed with WBC and TMBC.

11.1.4 The Volume 2: MA04 Map Book shows locations of key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) features and operational features (Map Series CT06) of the Proposed Scheme. It also shows the locations of landscape and visual impact mitigation measures (Map Series CT-06), viewpoints that would potentially be significantly affected at the construction (Map Series LV-03) and operation (Map Series LV-04) phases and Landscape Character Areas (LCA) that would potentially be significantly affected at the construction and operation phases (Map Series LV02).

11.1.5 The Volume 2: MA04 Map Book also includes Map Series LV-03 (Construction phase viewpoints) and Map Series LV-04 (Operation phase viewpoints) showing viewpoints that would potentially be significantly affected.

11.1.6 A separate, but related, assessment of effects on the setting of heritage assets is reported in Section 9, Historic environment.

## 11.2 Scope, assumptions and limitations

11.2.1 The scope, key assumptions and limitations for the landscape and visual assessment are set out in full in Volume 1 (Section 8) and the Scope and Methodology Report (SMR)[101].

11.2.2 Summer surveys for the landscape and visual assessment were undertaken from July 2017 to inform the assessment. Winter surveys were undertaken from February to March 2018. Further surveys will be undertaken to inform the assessment and will be

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

reported in the formal ES. At this stage it has not been possible to complete surveys of all publicly accessible land in this area. Therefore, for the working draft ES an assumption has been made about the level of sensitivity and magnitude of change on a case by case basis. This will be adjusted, as appropriate, on the basis of survey results to inform the formal ES.

11.2.3 The extent of the study area has been informed by construction and operational phase zones of theoretical visibility (ZTV). The ZTV have been produced in line with the methodology described in the SMR and are an indication of the theoretical visibility of the Proposed Scheme. In some locations, extensive vegetation cover would mean the actual extent of visibility is substantially less than that shown in the ZTV, and professional judgement will be used to further refine the study area to focus on likely significant effects.

11.2.4 Tall construction plant (for example cranes and piling rigs) is excluded from the ZTV for the construction phase, as there is a great degree of variability in the extent and timeframes of the visibility of construction activity and plant. Overhead line equipment rarely gives rise to significant effects if it is the only element visible and has, therefore, been excluded from the ZTV to give a better indication of the possible spread of significant effects to aid the assessment.

11.2.5 Landscape and visual receptors within approximately 1.5km of the Proposed Scheme have been assessed as part of the study area.

11.2.6 This assessment is based on preliminary design information and makes reasonable worst-case assumptions on the nature of potentially significant effects where these can be substantiated. It is based on information known at present. The assessment of visual effects during construction covers the situation in winter at peak activity. The assessment of operational visual effects covers the situation in winter and summer of year 1 and summer of year 15. The assessment of landscape effects is undertaken for the construction phase and for the operational phase at both year 1 and year 15. The landscape assessment does not consider seasonal variations e.g. winter/summer, since these do not affect character. Likely significant landscape and visual effects for year 30 will be reported in the formal ES

11.2.7 The assessment has been carried out on the basis that design of structures would, insofar as reasonably practicable, integrate with existing skyline features and would make use of a simple, clean and coherent palette of materials to help structures fit in the landscape.

11.2.8 Professional judgements on landscape value are summarised in the baseline descriptions and judgements on landscape susceptibility and sensitivity are summarised as part of the assessment of effects on each significantly affected LCA. Full judgement on values, susceptibility and sensitivity will be provided in the formal ES.

## 11.3 Environmental baseline

### Existing baseline

#### *Landscape baseline*

11.3.1 The study area extends from north of the M62, to the village of Lymm and Bridgewater Canal in the south. It encompasses a corridor approximately 3km wide along the route of the Proposed Scheme. It is a predominantly low lying, river valley landscape, gently rising in the south. The River Bollin and Mersey floodplains support rich meadows and rough pasture for grazing. Fields in intensive arable cultivation are medium to large in size with remnant hedgerows. Here the low levels of enclosure create an open landscape that allows extensive views to Winter Hill in the north. Smaller scale fields with intact hedgerows at settlement edges create a more enclosed landscape on a more intimate scale. Broadleaf woodland blocks are scattered throughout the area including Fox Covert, Gailey Wood, Spud Wood and Coroners Wood Ancient Woodland to the west of Partington. There are also areas of woodland associated with disused camp sites to the west of Cadishead. The watercourses of the River Bollin, Red Brook and River Mersey are tree lined.

11.3.2 Historic transportation routes make a strong contribution to landscape character. These include the 18th century Bridgewater canal, a tranquil corridor with a historic character derived from the canal side buildings, aqueducts, viaducts and bridges which contrast with the industrial scale of the Manchester Ship Canal, railway viaducts and former landfill sites. The dismantled railway line cutting across the study area from east to west forms a strong linear belt of woodland, visible from across the study area. The network of canals and railways alongside the River Bollin and Red Brook, support a wealth of recreational routes including the Cheshire Ring Canal Walk, Trans Pennine Trail and National Route 62 of the National Cycle Network, the Mersey Valley and Glazebrook Timberland Trails, and Bollin Valley Way.

11.3.3 The area has an extensive network of roads including the M6, M62, A57 Manchester Road, the A6144 Bent Lane/Paddock Lane/Warburton Lane and A56 Chester Road. There are few places in the study area where traffic noise is not audible. The Liverpool to Manchester (via Warrington Central) railway line and prominent overhead power lines are detracting elements in the landscape. There is street lighting in most settlements. Consequently, the area is not tranquil.

11.3.4 The large settlements of Lymm, Partington and Cadishead have abrupt interfaces with the rural landscape. The smaller settlements of Warburton, Mossbrow, Broomedge, Little Heatley, Glazebrook and Hollins Green, together with numerous scattered farmhouses, are more integrated into the landscape. The settlement pattern has been influenced by high water tables and river floodplains.

11.3.5 LCAs have been determined as part of an integrated process of environmental characterisation, informed by a review of historic landscape mapping and the outcome from other topics including ecological assessments. These LCAs will be refined, as appropriate, upon review of available historic landscape characterisation data and will be included in the formal ES. Use has been made of published landscape character assessments and a wide range of supporting geographical information

system (GIS) data, aerial photography and Ordnance Survey mapping, plus desk study and fieldwork. Landscape character assessments reviewed include the relevant National Landscape Character Areas[102] and the published landscape character assessments for Warrington[103], Salford[104] and Trafford[105]. These published LCA's have been adapted for this assessment to provide LCAs of an appropriate and consistent scale. Minor amendments have also been made to some published LCA boundaries to reflect existing conditions.

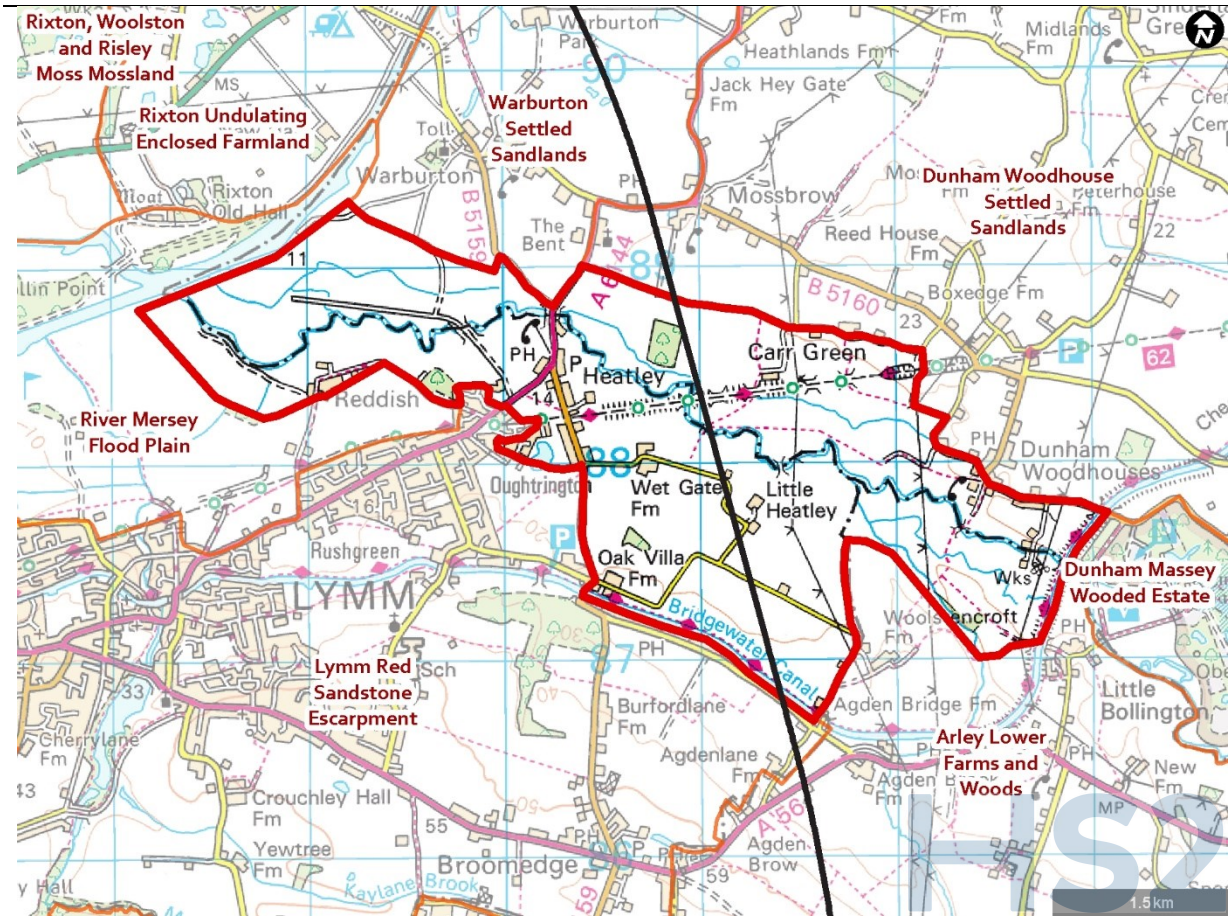
11.3.6 For the purposes of this assessment, the Broomedge to Glazebrook study area has been subdivided into 10 LCAs. These LCAs are draft and subject to review in consultation with local planning authorities. Full descriptions of all LCAs will be provided in Volume 5 of the formal ES. Six of the nine LCAs would not be significantly affected due to their distance from the Proposed Scheme and the presence of intervening vegetation which would contain landscape effects to areas relatively close to the Proposed Scheme. Holcroft and Glazebrook Moss Mosslands LCA would be significantly affected by the Proposed Scheme and is included in Volume 2: Community area report MA05: Risley to Bamfurlong as it is located for the most part within the Risley to Bamfurlong area.

11.3.7 A summary of the remaining three LCAs that would be significantly affected within the Broomedge to Glazebrook area is provided in Table 17.

[102] 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
[103] Warrington Landscape Character Assessment (2007). Available online at: https://www.warrington.gov.uk/downloads/file/8633/landscape_character_assessment_2007
[104] Salford City Council, Landscape Character Assessment. Available online at: https://www.salford.gov.uk/planning-building-and-regeneration/salfords-natural-environment/landscape/landscape-character-assessment
[105] Trafford Metropolitan Borough Landscape Strategy (2004). Available online at: http://www.trafford.gov.uk/planning/strategic-planning/docs/spg-2004-landscape-strategy.pdf

Table 17: Summary of Significantly Affected LCAs

**River Bollin Meadowlands**




The low lying and open landscape character of the RIver Bollin valley.

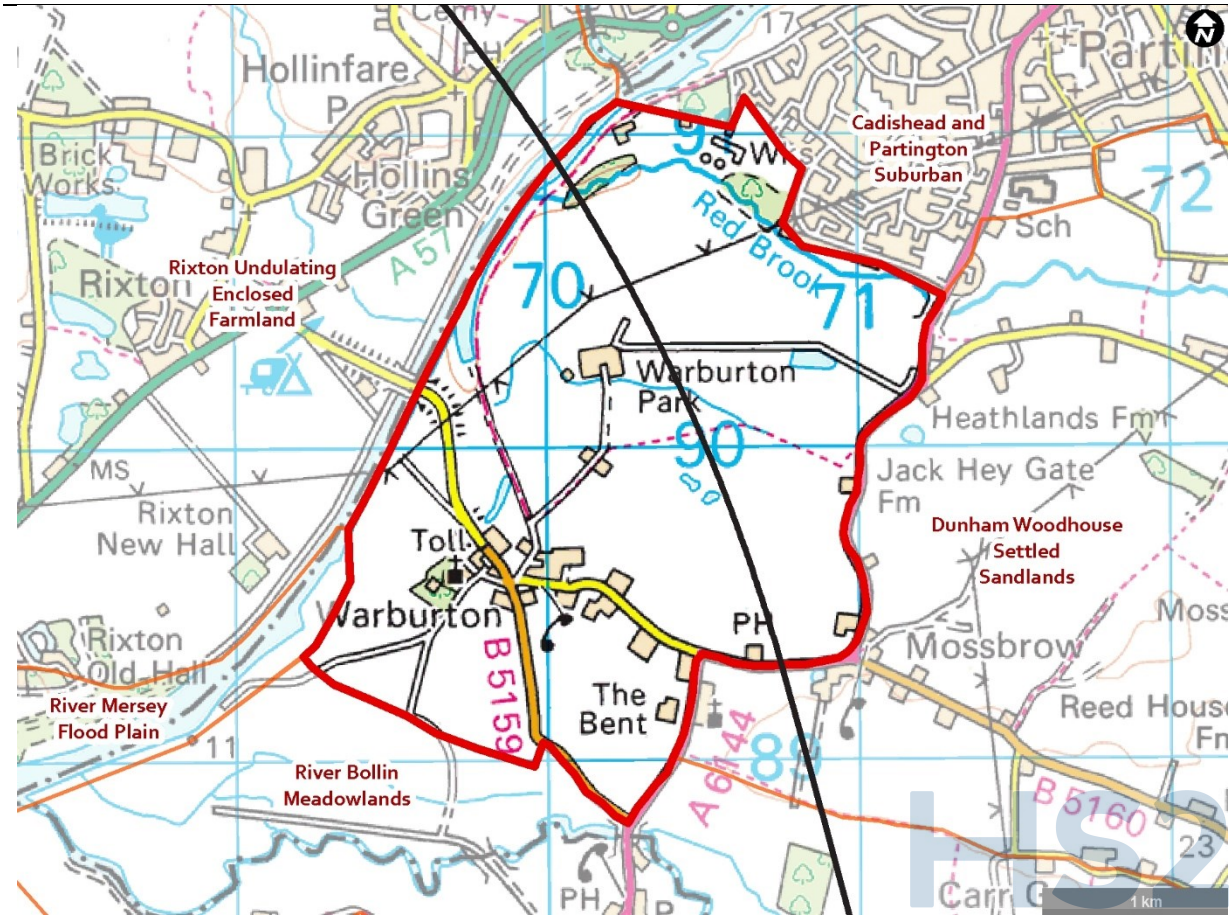
Wooded character of sections of the Trans Pennine Trail

The River Bollin Meadowlands LCA is a low-lying, rural area that follows the course of the River Bollin as it meanders through the landscape to join the Mersey valley, north of Lymm. The watercourses have a long history as routes for transporting goods; the River Mersey was used as a shipping route in Roman times, as have the 18th century Bridgewater Canal and the 19th century Manchester Ship Canal in more recent times. The watercourses and their associated floodplains have shaped the physical characteristics of this area including its natural terrain and patterns of agriculture, settlement, transport and vegetation. The main land use is mixed arable farming and pasture, with rough grassland and permanent pasture concentrated in the floodplain. Fields are of medium size, increasing in scale to the north, at the confluence of the rivers Bollin and Mersey, creating a more open landscape than to the south. Roadside hedges are well maintained, with remnant hedgerows and scattered trees along field boundaries. Belts of woodland, clusters of willows trees and marginal vegetation mark the courses of rivers, with scattered blocks of woodland on higher land. The

settlement pattern is of dispersed farmhouses and isolated cottages connected by a sparse network of unlit roads. In contrast, the busy and well-lit road junction at Heatley, lined with residential development, shops and restaurants has an urbanising influence on landscape character. The Bollin Valley Way, Trans Pennine Trail (long distance footpath and National Cycle Route 62), Cheshire Ring Canal Walk and numerous public rights of way (PRoW, contribute to the recreational value of the area. North-south connectivity is restricted by the small number of crossings points over the Manchester Ship Canal and Bridgewater Canal, giving the area a sense of seclusion and containment. Noise generated by light industrial units along the Bridgewater Canal, overhead power lines and the industrial chimneys at Irlam outside the boundary of the LCA, are detracting elements in an otherwise tranquil landscape.

The overall value of this LCA is medium based on the presence of historic water courses, extensive footpath network and a number of detracting elements described above.

**Warburton Settled Sandlands**



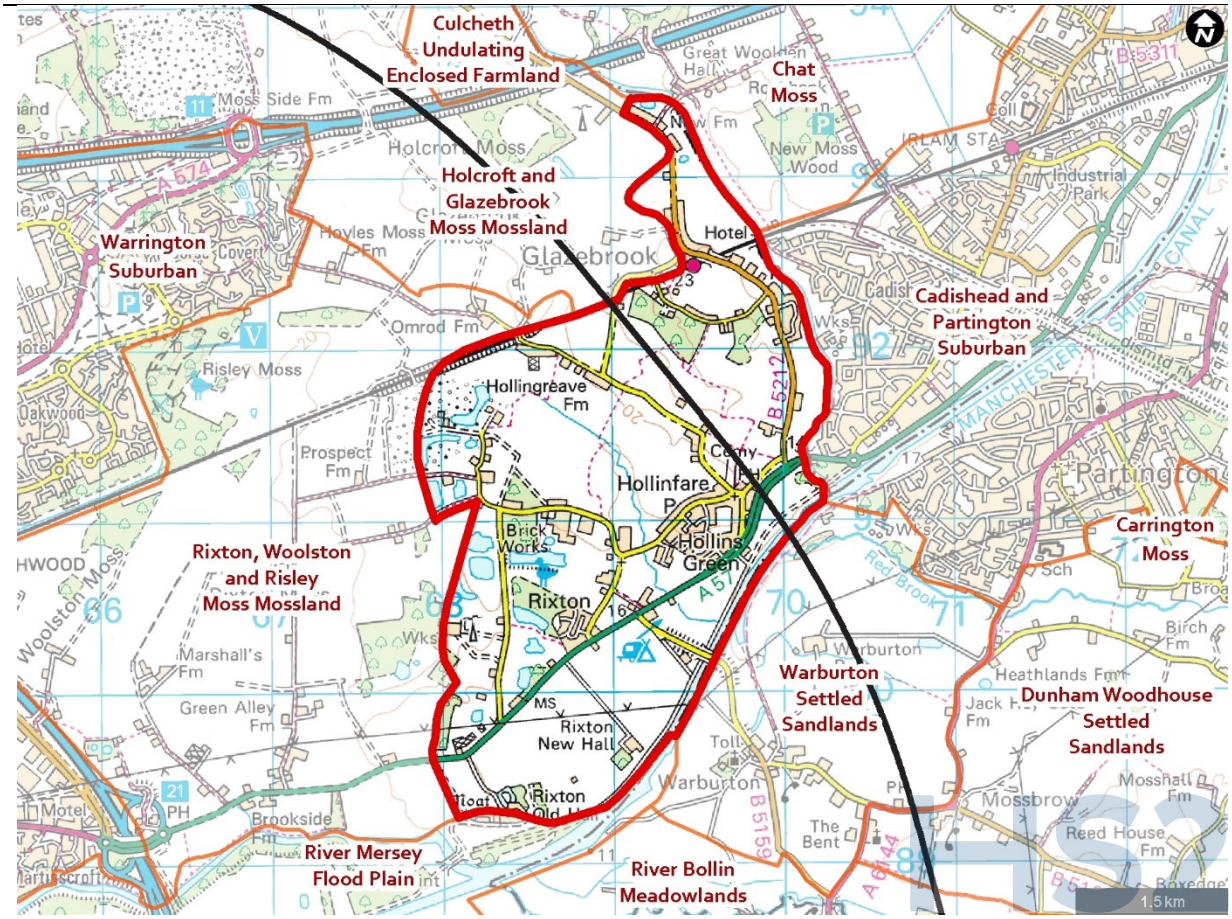

Medium scale fields and remnant hedges within the River Mersey floodplain.

Towpath along the River Mersey with bankside vegetation, in winter.

Warburton Settled Sandlands LCA is a low lying, rural landscape to the south east of the River Mersey and Manchester Ship Canal. The area's cultural history is evident in its many listed buildings and structures, including Arts and Crafts style buildings and the remnant manorial landscape of the Warburton Conservation Area. Numerous ponds are indicative of the former mosslands and their subsequent draining for agriculture. Small scale arable fields surround Warburton and Mossbrow, where woodland blocks and roadside trees, create a strong sense of containment associated with the settlements. Arable fields increase in size towards the River Mersey floodplain, with remnant hedgerows along field boundaries allowing more open views across the landscape. The once meandering alignment of the River Mersey (prior to canalisation) is reflected in distinct, sweeping field patterns to the north-west of Warburton village. The rural and agricultural character of the LCA is maintained by linear belts of woodland, including Coroners Wood (ancient woodland), that form a visual barrier to the industrial landscape of the Manchester Ship Canal and suburban area of Partington. Overhead powerlines, pylons, road noise and vehicles on the B5159 Warburton Bridge Road and A6144 Warburton Lane, detract from the tranquillity of the area, particularly during peak periods when traffic queues to use the Warburton toll bridge. The Red Brook Wildlife Trail through Coroners Wood, and a permissive footpath along the Manchester Ship Canal contribute to the recreational value of the area, however, pedestrian links beyond the LCA are restricted by the lack of crossing over the canal in the north and the busy A6144 Warburton Road in the south.

The overall value of this LCA is medium based on its cultural history, detracting infrastructure elements and ancient woodland.

**Rixton Undulating Enclosed Farmland**



| | |
|---|---|
| Medium to large scale field pattern with long distance views to Winter Hill.<br>  | Established hedgerows to arable fields to the north of Hollins Green<br>  |

The Rixton Undulating Enclosed Farmland LCA is an area of intensively farmed, open rural landscape between the Manchester Ship Canal and River Mersey in the south, and Liverpool to Manchester(via Warrington Central) railway line in the north. Localised variations in landform are indicative of past landfill operations around Rixton Clay Pits Nature Reserve and along the A57 Manchester Road. Land gently rises from the valleys of the River Mersey and the Glaze Brook, to the south and east respectively. The Glaze Brook is contained within a localised valley with limited visibility from the wider LCA. Arable fields are medium to large scale with remnant hedgerows and a network of ditches draining the heavy clay soils. Blocks of woodland at the disused campsites on Bank Street and Glazebrook Lane, near Rixton Clay Pits Nature Reserve (SSSI) and Rixton Old Hall are enclosing elements in this otherwise open landscape. Historically, glacial till was excavated for use in the brickmaking industry and the chimney of the former brickworks on Moss Side Lane is a prominent landmark. The village of Hollins Green is the main settlement, with mixed age residential properties lining rural roads, and farmhouses scattered across the rural landscape. There is a strong network of PRoW, including local walks around Rixton and the River Mersey Timberland Trail. 'The Weint' footpath around Hollins Green Churchyard is thought to be of pre-Roman origin. The RSPB Rixton Clay Pits Nature Reserve and Mosside Farm Fishery also add to the recreational value of the area. Connectivity with the surrounding area is limited by the small number of crossings over the Manchester Ship Canal and the Liverpool to Manchester (via Warrington Central) railway line. Detracting elements in the landscape include the A57 Manchester Road, Liverpool to Manchester (via Warrington Central) railway line and active landfill site at Moss Side. Country roads are mainly unlit at night, but there is streetlighting in settlements and at major road junctions. Pockets of tranquillity are found along footpaths to the north and east of Hollins Green.

The overall value of the LCA is medium based on the strong PRoW network, detracting infrastructure elements and open arable landscape.

### *Visual baseline*

11.3.8 A summary description of the distribution and types of receptors most likely to be affected is provided below. The viewpoints are numbered to identify their locations and are shown on the viewpoint location maps (see Volume 2: MA04 Map Book, Map Series LV-03 and LV-04). In each case, the middle number (xxx.**xx**.xxx) identifies the type of receptor that is present in this area – 1: Protected views (none within this area), 2: Residential, 3: Recreational[106], 4: Transport, 5: Hotels/healthcare/education and 6: Employment.

11.3.9 Residential views are available from the larger settlements of Lymm, Partington and Cadishead (part of the larger settlement of Irlam), from villages including Broomedge, Dunham Woodhouses, Hollins Green and Glazebrook, Mossbrow and Warburton and from numerous individual farmsteads.

11.3.10 Views experienced by residents on settlement edges are typically filtered and framed by intervening hedgerows which, combined with the low lying and gently undulating landform, restrict open views.

[106] Reference to specific civil parish numbers for footpaths is provided where available otherwise the adjacent road name is used as a reference to the footpath

11.3.11 The majority of public rights of way (PRoW) are in low-lying areas, and views experienced by users are generally restricted by hedgerows and woodland blocks where present. However, some sections of the long distance trails and canal towpaths including the Cheshire Ring Canal Walk, the Trans Pennine Trail, the Bridgewater Canal, the Mersey Valley and Glazebrook Timberland Trail are more open and longer views are possible for users of these routes.

11.3.12 Views experienced by travellers on rural roads are generally restricted by roadside hedgerows and mature trees - particularly to the south of the Manchester Ship Canal. However, the B5212 Glazebrook Lane, and Dam Lane to the north of the A57 Manchester Road are more open allowing mid-distance views. Views experienced by users on the lower lying A57 Manchester Road are generally more open to the south, including visibility over the Manchester Ship Canal south of Cadishead.

## 11.4 Temporary effects arising during construction

11.4.1 As is commonplace with major infrastructure works, the scale of the construction activities means that works would be visible from many locations and would have the potential to give rise to significant temporary effects that could not practicably be mitigated. Such effects are temporary and would vary over the construction period depending on the intensity and scale of the works at the time. The assessment of landscape and visual effects has been based on the activities occurring during the peak construction phase, which is defined as the period during which the main construction works would take place, including the presence of compounds, main earthworks and structure works.

11.4.2 The effects associated with the peak construction stage in this area are generally considered to be medium-term, based on the indicative construction programme in Section 2.3. It is currently anticipated that the civil engineering stage in this area would be undertaken between the start of the fourth quarter in 2024 and fourth quarter of 2029. Effects during other stages of works are likely to be less intensive due to less construction equipment being required at the time and a reduced intensity of construction activity.

11.4.3 Section 2.2 sets out the key permanent features of the Proposed Scheme and Section 2.3 describes the construction compounds and associated temporary works that have been considered in this assessment.

### Avoidance and mitigation measures

11.4.4 Measures that have been incorporated into Sections 12 and 14 of the draft Code of Construction Practice (CoCP)[107] to avoid or reduce landscape and visual effects, where reasonably practicable, during construction include the following:

[107] Supporting document: Draft Code of Construction Practice

- 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[108];
- use of well-maintained hoardings and fencing;
- prevention of damage to the landscape features adjacent to the construction sites due to movement of construction vehicles;
- designing lighting to avoid unnecessary intrusion onto adjacent buildings and other land uses; and
- replacement of any trees intended to be retained which may die as a consequence of nearby construction works.

11.4.5 Implementation of these measures has been taken into account in the assessment of the construction effects.

## Assessment of temporary impacts and effects

11.4.6 The most apparent changes to the landscape and to the views experienced by visual receptors during construction would relate to the presence of construction plant, compounds and soils and material storage and stockpiling. Key construction activities that would give rise to the most apparent changes to landscape and visual receptors are: the excavation of cuttings; construction of viaducts; construction of embankments; the removal of existing landscape elements including trees and hedgerows; and the closure and diversion of existing public highways and PRoW. Other key changes include: the construction of overbridges, underbridges, auto-transformer stations and overhead power lines; demolition of buildings and structures; the excavation of cuttings and the construction of viaducts and embankments.

### *Landscape assessment*

11.4.7 Based on the current design it is anticipated that the LCA set out in Table 18 would be significantly affected during construction of the Proposed Scheme.

[108] BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations, 2012, British Standard

Table 18: Summary description and assessment of effects on LCAs

| **River Bollin Meadowlands** | **Medium susceptibility and sensitivity** |
|---|---|
| **Susceptibility to change:** The open, rural character, recreational links and pockets of tranquillity have a medium susceptibility to change arising from the Proposed Scheme.<br><br>The clearance of a wide corridor of arable farmland, associated hedgerows and trees, riparian and meadow vegetation, the construction of a sequence of embankments, bridges and viaducts cutting across the River Bollin floodplain and the presence of construction activity associated with the Bridgewater Canal, Spring Lane, Wet Gate Lane and River Bollin viaduct satellite construction compounds, would noticeably alter the landscape character and change the landscape pattern of this rural area. Diversions of public roads, PRoW, long distance footpaths and a National Cycle Route would reduce pedestrian and vehicular connectivity across the wider LCA. Construction activity, vehicles and noise would reduce the tranquillity of the rural landscape.<br><br>There would therefore be an overall medium magnitude of change and moderate adverse effect. | **Level of effect**:<br><br>Moderate adverse (significant) |
| **Warburton Settled Sandlands** | **Medium susceptibility and sensitivity** |
| **Susceptibility to change:** The LCA's contained rural character around Mossbrow and Warburton, its recreational routes, historic canals and pockets of tranquillity have a medium susceptibility to change arising from the Proposed Scheme.<br><br>The loss of hedgerows, trees and sections of woodland at Coroners Wood ancient woodland and at Mossbrow during construction would noticeably alter the existing landscape pattern by removing tree cover that currently provides containment for settlements and defines the boundary of the LCA. The presence of the Proposed Scheme and localised changes to landform would create severance for the community at Mossbrow. The presence of construction activity and construction plant at the A6144 Paddock Lane, Warburton embankment and Manchester Ship Canal Viaduct South satellite construction compounds would substantially alter the character and tranquillity of this rural area, although existing traffic in the LCA can be intrusive. Diversions of PRoW would reduce connectivity across the wider countryside. Construction activity, noise and vehicle movements would reduce the tranquillity of the rural landscape. Construction operations would affect substantial proportion of the LCA.<br><br>There would therefore be an overall high magnitude of change and moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |
| **Rixton Undulating Enclosed Farmland** | **Medium susceptibility and sensitivity** |
| **Susceptibility to change:** The open, rural character influenced by adjacent settlements, pockets of tranquillity and recreational assets have a medium susceptibility to change arising from the Proposed Scheme.<br><br>The construction works of the Proposed Scheme would occupy a wide corridor through the rural landscape, resulting in the removal of trees and hedgerows and agricultural field and the disruption of the pattern of the landscape. Construction activity and the introduction of construction plant, in particular, at the Manchester Ship Canal viaduct North main compound, Dam Head Lane satellite compound and the Manchester Ship Canal Viaduct Central satellite compound would substantially alter the character of this rural area. Construction activity, vehicle movements and lighting in a largely unlit landscape may reduce the tranquillity along footpaths to the north and east of Hollins Green. There would be large scale changes to the local landform from the earthworks required for the Glazebrook embankment and Manchester Ship Canal viaduct and from the temporary stockpiling of materials. The diversion of footpaths would reduce connectivity in the wider countryside. Construction works would affect the central part of the LCA.<br><br>There would therefore be an overall medium magnitude of change and moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |

## *Visual assessment*

### Introduction

11.4.8 The following section describes the likely significant effects on visual receptors during construction. The construction assessment has been undertaken for the winter period, in line with best practice guidance, to ensure a robust assessment. However, in some cases, visibility of construction activities may be reduced during summer when vegetation, if present in a view, would be in leaf.

11.4.9 Where a viewpoint represents multiple types of receptor, the assessment is based on the most sensitive receptors. Effects on other receptor types with lower sensitivity would be lower than those reported.

11.4.10 Night-time surveys will be undertaken to inform the assessment in the formal ES. Potential visual impacts arising from additional lighting at night during construction within the area may arise from continuous working and/or overnight working. Assessment of these effects will be reported in the formal ES on completion of the night time assessment.

11.4.11 Table 19 describes the construction phase potentially significant visual effects based on the current design of the Proposed Scheme. Viewpoint locations are shown in Map Series LV-03 in the Volume 2: MA04 Map Book.

Table 19: Construction phase potentially significant visual effects

| | |
|---|---|
| **Views from residential properties on Agden Lane, Mill Lane, Spring Lane, Wet Gate Lane and from PRoW Lymm Footpath 33, the Bridgewater Canal and the Cheshire Ring Canal Walk (VPs 318-02-009, 319-03-003, 319-02-004, 319-03-005, 319-02-008, 319-02-010 and 319-02- 012)**<br><br>**Map number LV-03-318b and 319** | **High and medium-high sensitivity receptors** |
| Residents and recreational users would experience substantial changes to the rural character of existing near and middle-distance views, some filtered through intervening vegetation, due to the construction of the Lymm embankment, Bridgewater Canal underbridge, Spring Lane underbridge and River Bollin West viaduct. The A56 Lymm Road (in the Pickmere to Agden and Hulseheath area (MA03)), Bridgewater Canal, Spring Lane and Wet Gate Lane satellite compounds, earthworks and temporary material stockpiles would be uncharacteristic new features in open views across the River Bollin floodplain from Rose Cottages, Little Heatley and Heatleyheath Farm. Large scale construction elements would form the foreground to long distance sequential views of Winter Hill from the Bridgewater Canal and Lymm Footpath 33. Construction vehicles using a temporary site haul road west of the Proposed Scheme would introduce uncharacteristic vehicle movement into rural views. Removal of existing field boundary vegetation and woodland blocks would increase the visibility of the Proposed Scheme and material stockpiles used for temporary visual mitigation would have little effect due to the large scale of elements under construction.<br><br>There would therefore be an overall high magnitude of change and major adverse effect. | **Level of effect:**<br><br>Major adverse (significant) |
| **Views from the Trans Pennine Trail and PRoW Warburton Footpath 3 (north of Lower Carr Green Farm (VPs 319-03-011, 319-03-013 and 320-03-001)**<br><br>**Map number LV-03-319 and 320** | **High and medium-high sensitivity receptors** |
| Users of the Trans Pennine Trail and Warburton Footpath 3, would experience substantial changes to the rural character of near and middle-distance views, some partially filtered through intervening vegetation, as a result of the construction of the Lymm embankment, River Bollin West viaduct and Bridgewater embankment. The Wet Gate Lane and River Bollin Crossovers satellite compounds, construction machinery, earthworks and temporary materials stockpiles would be uncharacteristic additions to the existing views over the arable landscape and meadows of the River Bollin floodplain. | **Level of effect:**<br><br>Major adverse (significant) |

| | |
|---|---|
| Construction traffic on a temporary site haul road west side of the Proposed Scheme would introduce uncharacteristic vehicle movement into rural views. Removal of existing field boundary vegetation and woodland blocks would increase the visibility of the Proposed Scheme. Material stockpiles used for temporary visual mitigation would have little effect due to the scale of elements under construction<br><br>There would therefore be an overall high magnitude of change and major adverse effect. | |
| **Views from residential properties in Mossbrow, on Bent Lane and A6144 Warburton Lane (VPs 320-02-003 and 320-02-004)**<br><br>**Map number LV-03-320** | **High and medium-high sensitivity receptors** |
| Residents would experience substantial changes to the rural character of existing direct, near distance views and partially filtered middle-distance views as a result of the construction of the Warburton cutting, Warburton Footpath 3 accommodation overbridge and A6144 Paddock Lane overbridge. The A6144 Paddock Lane, Warburton embankment and Manchester Ship Canal viaduct south satellite construction compounds, earthworks and temporary material stockpiles would be introduced into existing views across arable fields to woodland and would be uncharacteristic of the rural landscape. Removal of existing field boundary vegetation and woodland would open up views of construction activity. Material stock piles used for temporary visual mitigation would have little effect due to the scale of elements under construction.<br><br>There would therefore be an overall high magnitude of change and major adverse effect. | **Level of effect:**<br><br>**Major adverse (significant)** |
| **Views from residential properties on Paddock Lane, Park Road, A6144 Warburton Lane and PRoW Warburton Footpath 11 (VPs 320-02-005, 320-02-006 and 320-02-007)**<br><br>**Map number LV-03-320** | **High and medium-high sensitivity receptors** |
| Residents would experience substantial changes to the rural character of existing near and middle-distance views, some partially filtered through existing vegetation, as a result of the construction of the Warburton cutting, A6144 Paddock Lane overbridge, Warburton embankment and Manchester Ship Canal viaduct. The A6144 Paddock Lane, Warburton embankment and Manchester Ship Canal viaduct south satellite construction compounds, earthworks and temporary material stockpiles would be introduced into views across arable fields. These elements would be uncharacteristic of existing views and substantially change the skyline across this flat and relatively open landscape. Removal of existing field boundary vegetation and woodland would open up views of construction. Material stockpiles used for temporary visual mitigation would have little effect due to the scale of elements under construction.<br><br>There would therefore be an overall high magnitude of change and major adverse effect. | **Level of effect:**<br><br>Major adverse (significant) |
| **Views from the PRoW Footpath BW footpath 2 along the Manchester Ship Canal towpath (VPs 321-03-001 and 321-03-002)**<br>**Map number LV-03-321** | **High and medium-high sensitivity receptors)** |
| Users of the canal and canal towpath would have sequential views towards the construction works for the Manchester Ship Canal viaduct. Views from the residential property, Millbank Hall Farm, would be partially filtered by existing vegetation and farm buildings. The Manchester Ship Canal viaduct south and central satellite construction compounds, earthworks and temporary material stockpiles would be uncharacteristic new features in existing views of the Manchester Ship Canal corridor and riparian landscape would change the skyline. Removal of trees from Coroners Wood ancient woodland and bankside vegetation would open up views of construction activity on the north bank of the Manchester Ship Canal and construction traffic using the A57 Cadishead Way.<br><br>There would therefore be an overall high magnitude of change and major adverse effect. | **Level of effect:**<br><br>Major adverse (significant) |
| **Views from residential properties on Dam Lane, PRoW Rixton-with-Glazebrook Footpaths 7, 8 and 14, Hollinfare Cemetery and the Black Swan Public House (VPs 321-03-004 and 321-02-006)**<br><br>**Map number LV-03-321** | **High and medium-high sensitivity receptors** |

| | |
|---|---|
| Residents on Dam Lane and recreational footpath users would experience substantial changes to the rural character of open and partially filtered near distance view as a result of the construction of the Manchester Ship Canal viaduct. The Manchester Ship Canal Viaduct North main compound, the Manchester Ship Canal Viaduct Central and Dam Head Lane satellite compounds, earthworks and temporary material stockpiles would be uncharacteristic new features in existing views across the gently undulating arable landscape and would dominate the skyline. Removal of existing woodland and field boundary vegetation would open up views of construction activity. Material stockpiles used as a temporary form of visual mitigation would have little effect due to the scale of elements under construction.<br><br>There would therefore be an overall high magnitude of change and major adverse effect. | **Level of effect:**<br><br>Major adverse (significant) |
| **Views from residential properties on Dam Lane, PRoW Rixton-with-Glazebrook Footpath 6, Glazebrook Lane and Vetch Close (VPs 321-02-005, 321-03-008, 321-02-009 and 321-02-010)**<br><br>**Map number LV-03-321** | **High and medium-high sensitivity receptors** |
| Residents and recreational footpath users would experience substantial changes to the rural character of existing near and middle-distance views as a result of the construction of the Manchester Ship Canal viaduct and Glazebrook embankment. The Manchester Ship Canal Viaduct North main compound, the Dam Head Lane and Glazebrook Railway south satellite compounds, earthworks and temporary material stockpiles would be uncharacteristic new features in existing views across the gently undulating arable landscape to woodland and would dominate the skyline. Construction traffic would use a temporary site haul road between Dam Lane and Dam Head Lane and would introduce uncharacteristic vehicle movement into rural views. Removal of existing woodland and field boundary vegetation would open up views of construction activity. Material stockpiles used for temporary visual mitigation would have little effect due to the scale of elements under construction.<br><br>There would therefore be an overall high magnitude of change and major adverse effect. | **Level of effect:**<br><br>Major adverse (significant) |
| **Views west from residential properties on B5212 Glazebrook Lane, Moss Farm and Church Farm (VP 322-02-001)**<br><br>**Map number LV-03-322a** | **High and medium-high sensitivity receptors** |
| Residents would experience substantial changes to the rural character of existing near and middle-distance views as a result of the construction of the Glazebrook embankment and Glazebrook (Railway) underbridge. For occupants of Church Farm, Moss Farm and the properties at the north-western end of Dam Lane, views of construction elements would be near-distance and direct and form the skyline. The Glazebrook Railway North satellite compound, earthworks and temporary material stockpiles would be uncharacteristic new features in existing views across the arable mossland basin landscape. Construction traffic would use a haul road the west of the Proposed Scheme introducing uncharacteristic vehicle movement into rural views. Removal of existing field boundary vegetation and woodland from the dismantled railway embankment would open up views of construction activity. Material stockpiles used as a temporary form of visual mitigation would have little effect due to the scale of elements under construction.<br><br>There would therefore be an overall high magnitude of change and major adverse effect. | **Level of effect:**<br><br>Major adverse (significant) |

## Other mitigation measures

11.4.12 To reduce the significant effects described above, consideration will be given during the detailed design stage to where planting can be established early in the construction programme to help achieve earlier landscape and visual integration. However, not all landscape and visual effects can be mitigated due to the visibility of construction activity and the sensitivity of surrounding receptors. No other mitigation measures are considered practicable during construction.

### Summary of likely residual significant effects

11.4.13 The temporary residual significant effects during construction remain as described above. These effects would be temporary and reversible in nature lasting only for the duration of the construction works. These residual effects would generally arise from the widespread presence of construction activity and construction plant within the landscape and viewed by surrounding residents, users of PRoW, major and minor roads within the study area.

11.4.14 The significant effects that would remain after implementation of construction phase mitigation are summarised below:

- moderate adverse effects in relation to three LCA;
- major adverse visual effects at 15 representative residential viewpoint locations; and
- major adverse visual effects at nine representative recreational viewpoint locations.

## 11.5 Permanent effects arising from operation

11.5.1 The permanent features of the Proposed Scheme that have been taken into account in determining the effects arising during operation on landscape and visual receptors are presented in Section 2.2 of this report.

### Avoidance and mitigation measures

11.5.2 The operational assessment of impacts and effects is based on year 1 (2033) and year 15 (2048) of the Proposed Scheme, with Year 30 (2063) to be reported in the formal ES. A process of iterative design and assessment has been employed, and is ongoing, to avoid or reduce adverse effects during the operation of the Proposed Scheme. Measures that would be integrated into the design of the Proposed Scheme include:

- design of earthworks to tie the engineering earthworks for embankments (such as the Lymm and Glazebrook embankments) and cuttings (such as the Warburton cutting) into their wider landscape context and to mitigate views of structures and overhead line equipment from sensitive receptors, where reasonably practicable. Earthworks design also takes account of the relationship to surrounding land uses and management, such as agriculture;
- compensatory woodland planting in areas of loss, using the same species composition and planting types (and appropriate planting density), such as landscape mitigation planting and woodland habitat creation to compensate for the partial loss of Coroners Wood ancient woodland and Fox Covert woodland and to provide habitat connectivity, enhanced landscape/green infrastructure connectivity, as well connectivity of historic landscape features, where reasonably practicable, and to soften embankments and viaduct abutments;
- hedgerow replacement and restoration in areas of loss to restore connectivity and landscape pattern, where reasonably practicable, and using an appropriate

palette of hedgerow types and species to tie the Proposed Scheme mitigation into the wider landscape character; and

- design of structures such as the River Bollin West viaduct and the Manchester Ship Canal viaduct to increase visual permeability and the continuity of landscape features, in insofar as reasonably practicable.

## Assessment of impacts and effects

11.5.3 The likely effects on landscape and visual receptors during operation of the Proposed Scheme relate to the presence of new structures and elements in the landscape including the Manchester Ship Canal viaduct and the River Bollin West viaduct, the presence of earthworks and overbridges. Other aspects include the presence of trains, overhead line equipment and noise fence barriers.

### *Landscape assessment*

11.5.4 Based on the current design, it is currently anticipated that the LCAs described in Table 20 would be significantly affected during operation of the Proposed Scheme.

Table 20: Operational phase significant landscape effects

| | |
|---|---|
| **River Bollin Meadowlands** | **Medium susceptibility and medium sensitivity** |
| **Susceptibility to change:** The open, rural character, recreational links and pockets of tranquillity have a medium susceptibility to change arising from the Proposed Scheme.<br><br>**Year 1:** The LCA would be directly affected by the severance of the landscape and changes to landform and vegetation cover. The introduction of large scale elements including the Lymm and Bridgewater embankments would be at variance with the low-lying character of the existing river valley landscape. Viaducts and underpasses would maintain some permeability across the landscape, but the sequence of embankments, bridges and viaducts crossing across the River Bollin floodplain would divide the LCA, resulting in changes to landscape pattern and scale, the diversion of footpaths and realignment of local roads. The historic setting and character of the landscape around the Bridgewater Canal would be affected by the introduction of the large-scale Bridgewater Canal underbridge, which would contrast strongly with the scale of the existing 18th century canal bridges and associated structures. The presence of large scale earthworks including the Lymm and Bridgewater embankments, the Wet Gate Lane auto transformer station, Warburton Footpath 3accommodation overbridge, noise fence barriers, boundary fencing and trains would introduce new infrastructure into the landscape that would be uncharacteristic across part of the character area.<br><br>There would therefore be an overall medium magnitude of change and moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |
| **Year 15:** Landscape and ecological mitigation woodland and hedgerow planting and wetland and grassland habitat creation would be sufficiently established to assist with some integration of the Proposed Scheme into the existing landscape by summer of year 15.<br><br>There would therefore be an overall medium magnitude of change and moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |
| **Warburton Settled Sandlands** | **Medium susceptibility and medium sensitivity** |

| | |
|---|---|
| **Susceptibility to change:** The contained rural character of Mossbrow and Warburton, its recreational routes and pockets of tranquillity have a medium susceptibility to change arising from the Proposed Scheme.<br><br>**Year 1:** The LCA would be directly affected through changes to landform and vegetation cover. The introduction of large scale elements including the A6144 Paddock Lane overbridge, Warburton cutting Warburton embankment and the Manchester Ship Canal viaduct would be at variance with the relatively level terrain. The removal of hedgerows, trees and woodland at Coroners Wood ancient woodland and Mossbrow would noticeably alter the existing landscape pattern. The presence of the Proposed Scheme and localised changes to landform would create severance for the community at Mossbrow, separating the Saracen's Head Pub from the village. The Manchester Ship Canal viaduct would be a new engineered structure in the landscape, on a far greater scale than the existing Warburton Toll bridge crossing. Footpath continuity would be accommodated beneath the viaduct, although perceptual and experiential qualities would be directly affected by the presence of trains and the associated infrastructure, reducing tranquillity.<br><br>There would therefore be an overall medium magnitude of change and moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |
| **Year 15:** Landscape and ecological mitigation woodland and hedgerow planting, wetland and grassland habitat creation would be sufficiently established to assist with some integration of the Proposed Scheme into the existing landscape.<br><br>There would therefore be an overall medium magnitude of change and moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |
| **Rixton Undulating Enclosed Farmland** | **Medium susceptibility and medium sensitivity** |
| **Susceptibility to change**: The open, rural character influenced by adjacent settlements, pockets of tranquillity and recreational assets have a medium susceptibility to change arising from the Proposed Scheme.<br><br>**Year 1:** The LCA would be directly affected by the introduction of new large-scale structures, severance of the landscape, changes to the landform and vegetation cover. The Manchester Ship Canal viaduct and the Glazebrook embankment would be prominent new, large-scale linear structures in the LCA. Although not wholly uncharacteristic of their setting given the presence of existing transport infrastructure in the area, the viaduct and to a lesser extent, the embankment, would be on a much larger scale than existing infrastructure. The Glazebrook embankment would result in diversion of PRoW Rixton-with-Glazebrook Footpath 14, to the south. The viaduct and embankment would be prominent new features in the landscape which would affect a large proportion of the character area. These changes would affect the central part of the LCA.<br><br>There would therefore be an overall medium magnitude of change and moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |
| **Year 15**: Landscape and ecological mitigation woodland and hedgerow planting, wetland and grassland habitat creation would be sufficiently established to assist with some integration of the Proposed Scheme into the existing landscape by summer of year 15. However, the large-scale of the Manchester Ship Canal viaduct would still be apparent.<br><br>There would therefore be an overall medium magnitude of change and moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |

## *Visual assessment*

### Introduction

11.5.5 The following section describes the likely significant effects on visual receptors during operation year 1 and year 15. Effects at operation year 30 will be reported in the formal ES. The assessment has been undertaken for the winter period, in line with best practice guidance, to ensure a robust assessment. However, in some cases,

visibility of the operational Proposed Scheme may be reduced during summer when vegetation, if present in a view, would be in leaf.

11.5.6 Where a viewpoint represents multiple types of receptor, the assessment is based on the most sensitive receptors. Effects on other receptor types with a lower sensitivity would be lower than those reported.

11.5.7 Table 21 identifies the locations where the operation of the Proposed Scheme would potentially result in significant effects. Viewpoint locations are shown in Map Series LV-04 in the Volume 2: MA04 Map Book.

Table 21: Operational phase significant visual effects

| **Views from residential properties on Agden Lane, Mill Lane, Spring Lane, Wet Gate Lane and from PRoW Lymm Footpath 33, the Bridgewater Canal and the Cheshire Ring Canal Walk (VPs 318-02-009, 319-03-003, 319-02-004, 319-03-005, 319-02-008, 319-02-010 and 319-02-012)**<br><br>**Map number LV-04-318 and 319** | **High and medium-high sensitivity receptors** |
|---|---|
| **Year 1 - winter and summer**<br><br>Residents and users of recreational footpaths would experience substantial changes to near and middle-distance views. The Lymm embankment, Bridgewater Canal and Spring Lane under bridges and River Bollin West viaduct, boundary fencing, overhead line equipment, noise fence barriers and the movement of trains would be viewed against the skyline and change the appearance of the existing landform, land use and field patterns. There would be long distance views to large scale elements including the Manchester Ship Canal viaduct, during winter months from elevated viewpoints along the Bridgewater Canal and PRoW Lymm Footpath 33. The Proposed Scheme would introduce new elements into existing views including the Wet Gate Lane auto transformer station. These elements would be uncharacteristic of the existing views, despite the presence of visually detracting structures including electricity pylons and industrial chimneys at Irlam. Landscape earthworks would provide some visual integration of the embankment, but newly planted mitigation woodland and hedgerows would not be sufficiently mature to contribute to any visual integration or enclosure.<br><br>There would therefore be an overall high magnitude of change and major adverse effect. | **Level of effect:**<br><br>Major adverse (significant) |
| **Year 15 – summer**<br><br>By summer year 15, views of the embankment, bridges, viaduct and boundary fencing for residents represented by VPs 318-02-009, 319-02-004, 319-02-010 and 319-02-012, would be partially screened by maturing landscape and ecological mitigation woodland and hedgerow planting. However, the height of the Proposed Scheme means that overhead line equipment and the movement of trains would continue to be prominent viewed against the skyline.<br><br>The magnitude of change would therefore remain high and there would be a major adverse effect. | **Level of effect:**<br><br>Major adverse (significant) |
| **Year 15 – summer**<br><br>For residents and users of recreational footpaths at representative VPs 319-03-003, 319-03-005, 319-02-008, the maturing landscape and ecological mitigation woodland and hedgerow planting, would partially screen views to the embankment bridges and viaducts. However, the height of the Proposed Scheme means that overhead line equipment and the movement of trains would continue to be a component of views across the landscape.<br><br>The magnitude of change would therefore reduce to medium and there would be a moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |

| | |
|---|---|
| **Views from the Trans Pennine Trail and PRoW Warburton Footpath 3 (north of Lower Carr Green Farm) (VPs 319-03-011, 319-03-013 and 320-03-001)**<br><br>**Map number LV-04-319 and 320** | **High and medium-high sensitivity receptors** |
| **Year 1 - winter and summer**<br><br>Walkers along the towpath would experience substantial changes to direct near-distance and oblique middle-distance views across the Mersey Valley as a result of operation of the Proposed Scheme. There would be sequential and partially screened views towards the Lymm embankment and Heatley embankment and the River Bollin West viaduct would be viewed against the skyline in direct views east and west from the Trans Pennine Trail. These structures would alter the appearance of the existing landform and pattern of the landscape. Noise fence barriers, overhead line equipment and moving trains would be uncharacteristic of the existing rural views. Mitigation woodland and hedgerows would not be sufficiently mature to contribute to any visual integration or enclosure at this stage.<br><br>There would therefore be an overall high magnitude of change and major adverse effect. | **Level of effect:**<br><br>Major adverse (significant) |
| **Year 15- summer**<br><br>The landscape and ecological mitigation woodland and hedgerow planting would assist with some integration of the Proposed Scheme into the existing landscape. Planting would partially filter views of the Proposed Scheme across the Mersey Valley, but trains and overhead line equipment would remain visible in near distance views. The River Bollin West viaduct would remain as a new prominent feature in views from the Trans Pennine Trail.<br><br>The magnitude of change would therefore reduce to medium and there would be a moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |
| **Views from residential properties in Mossbrow, on Bent Lane, and A6144 Warburton Lane (VPs 320-02-003 and 320-02-004)**<br><br>**Map number LV-04-320** | **High and medium-high sensitivity receptors** |
| **Year 1 - winter and summer**<br><br>The Warburton Footpath 3 accommodation access overbridge, Warburton cutting and A6144 Paddock Lane overbridge would be new large-scale elements, prominent in near and middle-distance views from residential properties. The A6144 Paddock Lane overbridge would be visible against the skyline in close views from Mossbrow Farm. Noise fence barriers, overhead line equipment and moving trains would be uncharacteristic of the existing rural views. The Warburton cutting would be partially screened by landscape earthworks, but landscape mitigation woodland and hedgerows would not be sufficiently mature to contribute to any visual integration at this stage.<br><br>There would therefore be an overall high magnitude of change and a major adverse effect. | **Level of effect:**<br><br>Major adverse (significant) |
| **Year 15- summer**<br><br>Mitigation planting would partially filter views to the Proposed Scheme. However, traffic using the A6144 Paddock Lane overbridge, trains and overhead line equipment would remain visible in near distance views above the woodland and hedgerow planting.<br><br>The magnitude of change would therefore reduce to medium and there would be a moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |
| **Views from residential properties on Paddock Lane, Park Road, A6144 Warburton Lane and PRoW Warburton Footpath 11 (VPs 320-02-005, 320-02-006 and 320-02-007)**<br><br>**Map number LV-04-320** | **High and medium-high sensitivity receptors** |
| **Year 1 - winter and summer**<br><br>Residents and users of PRoW would experience noticeable changes to near and middle-distance views as a result of the operation of the Proposed Scheme. Removal of existing vegetation during | **Level of effect:** |

| | |
|---|---|
| construction, would result in the loss of key elements that contribute to the rural character of existing views. The Warburton cutting, A6144 Paddock Lane overbridge, Warburton embankment and Manchester Ship Canal viaduct would be large-scale new structures that would alter the appearance of the existing rural landscape. The Proposed Scheme would introduce new uncharacteristic elements into existing views including noise fence barriers, overhead line equipment and moving trains. The A6144 Paddock Lane overbridge would be visible against the skyline in views east from Paddock Lane and south-west from Jack Hey Farm. Views into the Warburton cutting would be partially screened by landscape earthworks. Mitigation planting would not be sufficiently mature to contribute to any visual integration or enclosure at this stage.<br><br>There would therefore be an overall high magnitude of change and major adverse effect. | Major adverse (significant) |
| **Year 15- summer**<br><br>Views of the Proposed Scheme would be partially screened or filtered by landscape earthworks and landscape mitigation planting. However, traffic using the A6144 Paddock lane overbridge would be visible above the planting, together with moving trains and overhead line equipment. The Manchester Ship Canal viaduct would remain as a new, visually prominent component of middle distance views to the north.<br><br>The magnitude of change would reduce to medium and there would be a moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse<br><br>(significant) |
| **Views from the PRoW Footpath BW Footpath 2 along the Manchester Ship Canal towpath (VPs 321-03-001 and 321-03-002)**<br><br>**Map number LV-04-321** | **High and medium-high sensitivity receptors** |
| **Year 1 - winter and summer**<br><br>Users of the canal towpath would experience a substantial alteration to existing views along the canal corridor as a result of the operation of the Proposed Scheme. The verdant character of these views would be diminished by the loss of vegetation during construction. The Manchester Ship Canal viaduct would be visible as an imposing, high, linear element sailing over the existing landscape in sequential views from the towpath. Views from Millbank Hall Farm would be partially filtered by existing vegetation and farm buildings, but the viaduct would be a new noticeable feature in the view. Due to the height of the structure, the overhead line equipment, noise fence barriers and movement of trains would not be prominent in views from these locations. Although high, the Manchester Ship Canal viaduct would not be out of place seen in the context of the industrial scale and character of the Manchester Ship Canal.<br><br>There would therefore be an overall high magnitude of change and major adverse effect. | **Level of effect:**<br><br>Major adverse (significant) |
| **Year 15- summer**<br><br>Due to the scale of the structure mitigation woodland planting would not contribute to any visual integration of the viaduct, though natural regeneration would restore vegetation lost along the canal towpath.<br><br>The magnitude of change would therefore remain high and there would be a major adverse effect. | **Level of effect:**<br><br>Major adverse (significant) |
| **Views from residential properties on Dam Lane, PRoW Rixton with Glazebrook Footpath 7, 8 and 14, Hollinfare Cemetery and the Black Swan Public House (VPs 321-03-004 and 321-02-006)**<br><br>**Map number LV-04-321** | **High and medium-high sensitivity receptors** |
| **Year 1 - winter and summer**<br><br>Residents of Dam Lane, visitors to the Hollinfare Cemetery and the Black Swan public house and users of the PRoW would experience a substantial alteration to existing views as the Manchester Ship Canal viaduct would be an imposing, high, linear element sailing over the existing landscape. The Manchester Ship Canal viaduct would be visible as a new large-scale element, uncharacteristic of existing near and mid-distance views of the settlement edge and open countryside. Due to the height of the structure, the overhead line equipment, noise fence barriers and movement of trains would not | **Level of effect:**<br><br>Major adverse (significant) |

| | |
|---|---|
| be prominent in views from these locations. Long views across the landscape under the viaduct deck and between piers would be possible.<br><br>There would therefore be an overall high magnitude of change and major adverse effect. | |
| **Year 15- summer**<br><br>Due to the scale of the viaduct structure, mitigation planting would not contribute to visual integration in the landscape.<br><br>The magnitude of change would therefore remain high and there would be a major adverse effect. | **Level of effect:**<br><br>Major adverse (significant) |
| **Views from residential properties on Dam Lane, PRoW Rixton-with-Glazebrook Footpath 6, Glazebrook Lane and Vetch Close (VPs 321-02-005, 321-03-008, 321-02-009 and 321-02-010)**<br><br>**Map number LV-04-321** | **High and medium-high sensitivity receptors** |
| **Year 1 - winter and summer**<br><br>Residents and users of PRoW would experience substantial changes to near and middle-distance views. The Manchester Ship Canal viaduct and Glazebrook embankment would be new large-scale elements that would form the skyline in views from the east. The Proposed Scheme would be more prominent in views than the existing Liverpool to Manchester (via Warrington Central) railway line, which is in cutting and is well integrated into the existing landscape by lineside vegetation. The viaduct and embankment would alter the existing pattern of the landscape would be new uncharacteristic elements in existing views, along with the Glazebrook auto-transformer station, overhead line equipment and moving trains. The Dam Head Lane diversion would introduce traffic into existing views of fields and hedgerows. Mitigation planting would not be sufficiently mature to contribute to any visual integration or enclosure at this stage.<br><br>There would therefore be an overall high magnitude of change and major adverse effect. | **Level of effect:**<br><br>Major adverse (significant) |
| **Year 15- summer**<br><br>By summer year 15, views of the Glazebrook embankment and Bank Street realignment would be partially screened by the maturing landscape mitigation planting. However, moving trains and overhead line equipment would be visible above the line of planting. The Manchester Ship Canal viaduct would remain highly visible due to the large scale of this structure.<br><br>The magnitude of change would therefore reduce to medium and there would be a moderate adverse effect. | **Level of effect:**<br><br>Moderate adverse (significant) |
| **Views from residential properties on Glazebrook Lane, Moss Farm and Church Farm (VP 322-02-001) Map number LV-04-322** | **High and medium-high sensitivity receptors** |
| **Year 1 - winter and summer**<br><br>Residents would experience substantial changes to near and middle-distance views as a result of the Proposed Scheme. The Glazebrook embankment would be a new large-scale structure, viewed against the skyline. For residents of Church Farm and Moss Farm, the Glazebrook embankment would replace existing views to Glazebrook Moss. The Proposed Scheme would alter the appearance of the existing landform, land use and field patterns, and would introduce new elements, uncharacteristic of existing views, including noise fence barriers, overhead line equipment and moving trains. Mitigation planting would not be sufficiently mature to contribute to any visual integration or enclosure at this stage.<br><br>There would therefore be an overall high magnitude of change and major adverse effect. | **Level of effect:**<br><br>Major adverse (significant) |
| **Year 15- summer** | **Level of effect:**<br><br>Moderate adverse (significant) |

| | |
|---|---|
| Views to the Proposed Scheme would be partially filtered by mitigation planting, however, the scale of the Glazebrook embankment means that trains and overhead line equipment would be visible in near-distance views.<br><br>The magnitude of change would therefore reduce to medium and there would be a moderate adverse effect. | |

## Other mitigation measures

11.5.8 The permanent effects of the Proposed Scheme on landscape and visual receptors have been reduced through integration of the measures described in this section. Effects in Year 1 may also be further reduced through establishing planting early or in advance of the main construction programme. Other features such as additional earthworks, planting or greenspace, including use of materials, would be considered as part of the ongoing development of contextual design. These measures would potentially provide additional screening and/or greater integration of the Proposed Scheme into the landscape.

## Summary of likely residual significant effects

11.5.9 In many cases, significant effects would reduce over time as the proposed mitigation planting matures and reaches its designed intention. However, the following likely residual significant effects would remain following Year 15 of operation:

- moderate adverse effects in relation to three LCAs;
- major adverse effects at five residential viewpoint locations;
- major adverse effects at three recreational viewpoint locations;
- moderate adverse visual effects at 10 residential viewpoint locations; and
- moderate adverse visual effects at six recreational viewpoints.

## Monitoring

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

11.5.11 There are no area-specific requirements for monitoring landscape and visual mitigation during the operation of the Proposed Scheme in the Broomedge to Glazebrook area.

# 12 Socio-economics

## 12.1 Introduction

12.1.1 This section reports on the environmental baseline, likely economic and employment impacts and significant effects identified to date during construction and operation of the Proposed Scheme within the Broomedge to Glazebrook area. The assessment considers existing businesses, community organisations, local employment and local economies, including planned growth and development.

12.1.2 Engagement with Warrington Borough Council (WBC) and Trafford Metropolitan Borough Council (TMBC) has been undertaken as part of the development of the Proposed Scheme. The purpose of the engagement was to increase the understanding of socio-economic characteristics identified through a review of publicly available data. Engagement will continue as part of the development of the Proposed Scheme and to inform the formal assessment.

12.1.3 The socio-economic effects on employment at a route-wide level will be reported in Volume 3, Route-wide effects (Section 12).

12.1.4 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2: MA04 Map Book.

## 12.2 Scope, assumptions and limitations

12.2.1 The scope, assumptions and limitations for the socio-economics assessment will be set out in Volume 1 (Section 8) and the SMR.

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

12.2.3 Businesses may experience isolation effects as a result of the Proposed Scheme. Likely significant isolation effects will be reported in the formal ES.

12.2.4 The assessment has been carried out on the basis that design of structures would, insofar as reasonably practicable, integrate with existing skyline features and would make use of a simple, clean and coherent palette of materials to help structures fit in the landscape.

## 12.3 Environmental baseline

### Existing baseline

#### *Study area description*

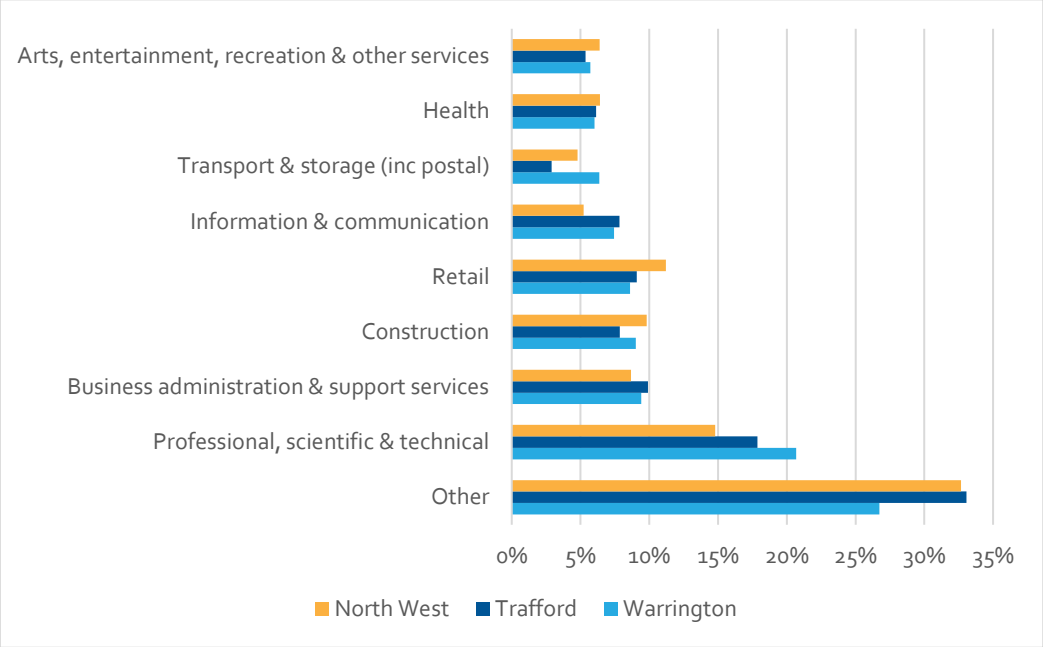
12.3.1 The following provides a brief overview of employment, economic structure, labour market and business premises availability within the Broomedge to Glazebrook area. It lies within the administrative areas of WBC and TMBC which is within the Greater Manchester Combined Authority area. The northern and southern sections of the area

fall within the Cheshire and Warrington Local Enterprise Partnership (LEP) area[109] and the central section of the area falls within the Greater Manchester LEP area[110]. It also falls within the North West region.

### *Business and labour market*

12.3.2 In 2017, within the WBC area, the professional, scientific and technical sector accounted for the largest proportion of organisations (21%)[111]. Construction, retail and business administration and support services sectors were second largest (each 9%). This was followed by information and communications (7%). Within the TMBC area the professional, scientific and technical sector accounted for the largest proportion of organisations (18%). Financial and insurance sectors accounted for the second largest (11%), followed by business administration and support services (10%). This is shown in Figure 8. For comparison, in the North West region, the largest sectors were professional, scientific and technical (15%), followed by retail (11%) and construction (10%).

Figure 8: Business sector composition in the WBC and TMBC areas and the North West[112, 113]



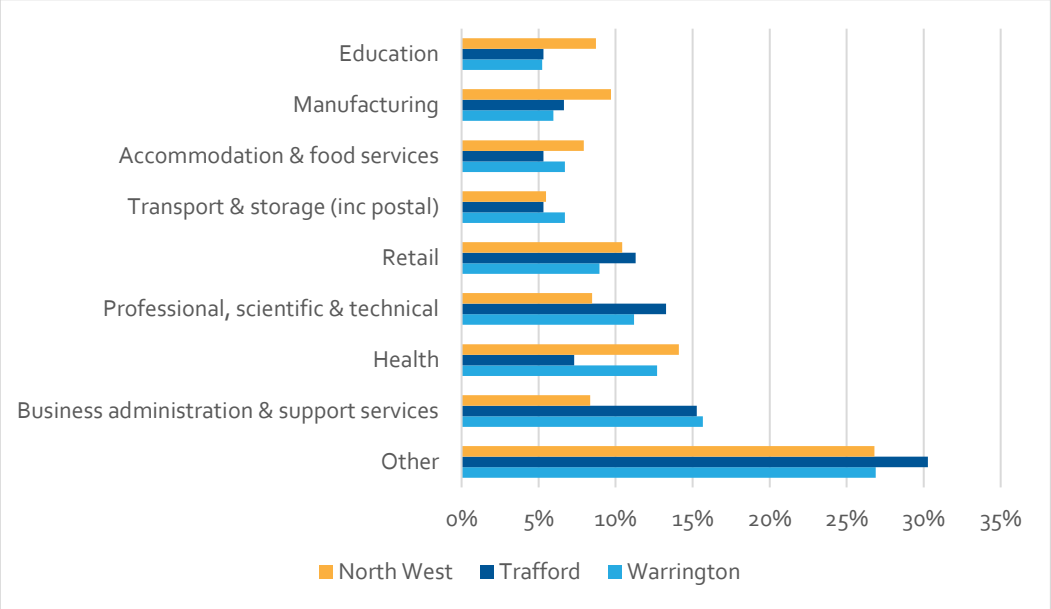

12.3.3 In 2016, approximately 133,000 people worked in the WBC area[114]. According to the Office for National Statistics Business Register and Employment Survey 2016, the largest sectors in terms of share of employment in WBC were: business administration and support services (16%), health (13%) and professional, scientific and technical

[109] Cheshire and Warrington Enterprise Partnership (2014). Cheshire and Warrington Matters: A Strategic and Economic Plan for Cheshire and Warrington. [online] p.45. Available at: http://www.871candwep.co.uk/content/uploads/2015/05/Strategic-and-Economic-Plan-and-Growth-Plan-for-Cheshire-and-Warrington.pdf
[110] Greater Manchester Local Enterprise Partnership (2013). Stronger Together - Greater Manchester Strategy. GMCA
[111] Office for National Statistics; (2017); UK Business Count – Local Units; http://www.nomisweb.co.uk
[112] Office for National Statistics; (2017); UK Business Count – Local Units; http://www.nomisweb.co.uk
[113] 'Other' includes: Manufacturing; Accommodation and food services; Wholesale; Motor trades; Property; Education; Financial and insurance; Agriculture, forestry and fishing; Mining, quarrying and utilities; Public administration and defence
[114] Office for National Statistics; (2016); Business Register and Employment Survey; http://www.nomisweb.co.uk; this number includes both residents and non-residents of WBC who work within its boundaries

(11%)[115]. In 2016, approximately 150,000 people worked in the TMBC area. The largest sectors in terms of share of employment in the TMBC area were: business administration and support services (15%), professional, scientific and technical (13%) and retail (11%).

12.3.4 These compare with the largest sectors for the North West region, which were: health (14%), retail, and manufacturing (both 10%) and education (9%). This is shown in Figure 9.

Figure 9: Employment by industrial sector in the WBC and TMBC areas and the North West[116, 117]




12.3.5 According to the Annual Population Survey (2016)[118], the employment rate[119] within the WBC area was 76% (100,900 people) and 80% (118,400 people) in the TMBC area. These were higher than that estimated for the North West (72%) and England (74%). Unemployment in the WBC area was 3.2% and 2.7% in the TMBC area, both of which are lower than that estimated for the North West (5.3%) and England (5%).

12.3.6 The Annual Population Survey (2016) also shows that 38% of WBC residents and 52% of TMBC residents aged 16-64 were qualified to National Vocational Qualification Level 4 (NVQ4) and above. This is compared to 34% in the North West and 38% in England. Seven percent of WBC residents and 5% of TMBC residents had no qualifications, which is lower than those for the North West (10%) and England (8%).

[115] Office for National Statistics; (2016); Business Register and Employment Survey; http://www.nomisweb.co.uk; this number includes both residents and non-residents of WBC who work within its boundaries
[116] Office for National Statistics; (2016); Business Register and Employment Survey; http://www.nomisweb.co.uk
[117] Percentage of employees within broad industrial groups. 'Other' includes: Construction; Wholesale; Information and communication; Public administration and defence; Arts, entertainment, recreation and other services; Mining, quarrying and utilities; Motor trades; Financial and insurance; Property; Agriculture, forestry and fishing.
[118] Annual Population Survey (2016), NOMIS. Available online at https://www.nomisweb.co.uk
[119] The proportion of residents aged 16-64 that are in employment

### *Property*

12.3.7 A review of employment land in 2016[120] within the WBC area identified further land needed, in addition to the land currently identified as available, of 276.4ha to 2037. This equates to an average of 13.2ha per year[121]. Therefore, there is potentially a shortfall of available employment land in the borough, including both strategic sites for logistics or distribution and local sites, along with a sizable office requirement.

12.3.8 The 2009 Trafford Employment Land Study identified the need for up to 170ha of employment land in TMBC between 2007 and 2026, amounting to 8.9ha a year[122]. An update to this study in 2013 concluded that there was sufficient land identified in TMBC's Core Strategy to meet projected requirements up to 2026[123].

## 12.4 Effects arising during construction

### Avoidance and mitigation measures

12.4.1 The draft CoCP[124] includes a range of provisions that would help mitigate socio-economic effects associated with construction within this area, including:

- reducing nuisance through sensitive layout of construction sites (Section 5);
- consulting businesses located close to hoardings on the design, materials used and construction of the hoarding, to reduce impacts on access to and visibility of their premises (Section 12);
- applying best practicable means during construction works to reduce noise (including vibration) at sensitive receptors (including local businesses) (Section 13);
- monitor and manage flood risk and other extreme weather events that may affect socio-economic resources during construction (Section 13);
- site specific traffic management measures including requirements relating to the movement of traffic from business and commercial operators of road vehicles, including goods vehicles (Section 14); and
- maintaining access to businesses for the duration of construction works where reasonably practicable (Section 14).

### Assessment of impacts and effects

12.4.2 The proposed construction works are assessed for socio-economic effects in relation to:

- premises demolished with their occupants and employees needing to relocate to allow for construction of the Proposed Scheme;

[120] BE Group and Mickledore (2016). *Economic Development Needs Study*. Warrington Borough Council
[121] This is further land need additional to the current realistic supply of 104.5ha to 2037
[122] Ove Arup and Partners Ltd (2009), *Trafford Employment Land Study: Final Report*. Based on upper range.
[123] Trafford Metropolitan Borough Council (2013), *Trafford Employment Land Study*
[124] Supporting document: Draft Code of Construction Practice

- in-combination effects (e.g. air quality, noise, vibration, construction traffic and visual impacts) and isolation of an area, which could affect business operations, will be reported in the formal ES. Any resulting effects on employment will be reported at a route-wide level (see Volume 3, Route-wide effects); and
- potential employment opportunities arising from construction in the local area (including in adjacent community areas).

### *Temporary effects*

#### Construction employment

12.4.3 It is currently expected that there would be one main construction compound, Manchester Ship Canal Viaduct North main compound, 11 satellite civil engineering compounds and three rail systems compounds in the Broomedge to Glazebrook area. The works undertaken at and managed from these sites would result in the creation of up to 1,600 person years of construction employment[125], which is broadly equivalent to 160 full-time jobs[126]. Depending on the skill levels required and the skills of local people, the employment is potentially accessible to residents in the locality and to others living further afield. The impact of the direct construction employment creation has been considered as part of the route-wide assessment (see Volume 3, Route-wide effects).

12.4.4 Construction and the related direct employment could also lead to opportunities for local businesses to supply the Proposed Scheme or to benefit from expenditure of construction workers. The impact of the indirect construction employment creation has been considered as part of the route-wide assessment (see Volume 3, Route-wide effects).

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

### *Permanent effects*

#### Businesses

12.4.6 Businesses directly affected, comprising those that lie within land required for the Proposed Scheme, are reported in groups, where possible, to form defined resources based on their location and operational characteristics. A group could contain either one or a number of businesses reflecting the fact that a building may have more than one occupier or that similar businesses and resources are clustered together.

12.4.7 Five business accommodation units or sites in the study area would experience direct impacts as a result of the Proposed Scheme. These five units or sites, together, form five defined resources including:

[125] 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
[126] Based on the convention that 10 employment years is equivalent to one full time equivalent job

- Agden Bridge (one unit engaged in provision of a riding school);
- Moss Brow (one unit engaged in provision of farm produce);
- Paddock Lane (one unit engaged in provision of a public house);
- Hollins Green (one unit engaged in provision of a public house); and
- Church Farm (one unit engaged in provision of horse riding for the disabled).

12.4.8 Of the five resources identified, one business could potentially experience significant direct effects on business activities and employment, as set out in Table 22.

Table 22: Resource which would potentially experience significant direct effects

| Resource | Description of business activity |
|---|---|
| A public house in Hollins Green | Public house and restaurant with associated hotel accommodation. |

### *Impact magnitude*

12.4.9 The magnitude of impact focuses on the number of jobs that would be affected by the Proposed Scheme, either through displacement or possible job loss. It also considers the implications of this impact in relation to the scale of economic activity and opportunity in the area.

### *Sensitivity*

12.4.10 The sensitivity of resources considers the following:

- availability of alternative, suitable premises;
- size of the local labour market;
- skill levels and qualifications of local people; and
- levels of unemployment.

### *Significance of effects*

12.4.11 Taking account of the sensitivity of the resource and the magnitude of impact, it is currently expected that the significance of the resultant effects would be as set out in Table 23.

Table 23: Significance of effects on resources

| Resource | Impact magnitude | Sensitivity | Significance of effect |
|---|---|---|---|
| A public house in Hollins Green | Medium | Medium | Moderate adverse – significant |

12.4.12 The construction works for the Manchester Ship Canal viaduct would temporarily require approximately half of the land used for car parking and a small amount of the beer garden at the public house in Hollins Green for over three years. While the building will be unaffected, the loss of approximately half of the car parking spaces used by customers may discourage visitors from coming to the public house and accommodation, reducing its ability to attract custom. The effect on this resource is assessed to be moderate adverse and would therefore be significant.

12.4.13 Among all the affected resources, whether significantly affected or not, it is estimated that 60 jobs[127] would either be displaced or possibly lost within the Broomedge to Glazebrook area. There is a reasonable probability that businesses would be able to relocate to places that would still be accessible to residents due to the general availability of vacant premises. However, there may be cases where alternative locations are problematic, and businesses may be unable to relocate on a like-for-like basis within the area. The impact on the local economy from the relocation or loss of jobs is considered to be relatively modest in the context of the total number of people employed in the local authorities concerned (approximately 133,000 jobs in WBC and 150,000 jobs in TMBC) and the scale of economic activity and opportunity in the area.

12.4.14 The resulting effects on employment will be reported in aggregate at a route-wide level (see Volume 3, Route-wide effects).

### Other mitigation measures

12.4.15 Businesses displaced by the Proposed Scheme would be compensated in accordance with the Compensation Code. HS2 Ltd recognises the importance of businesses, displaced from their existing premises, being able to relocate to suitable alternative premises and at this stage it assumes that it would, therefore, adopt a policy to offer additional support over and above statutory requirements to facilitate this process as it has done on Phases One and 2a.

12.4.16 The construction of the Proposed Scheme offers considerable opportunities to businesses and residents along the line of route in terms of supplying goods and services and obtaining employment. HS2 Ltd at this stage assumes that it would, therefore, adopt a policy to work with its suppliers to build a skilled workforce that promotes further economic growth across the UK as it has done on Phases One and 2a.

### Summary of likely residual significant effects

12.4.17 Any likely residual significant socio-economic effects will be reported in the formal ES.

## 12.5 Effects arising from operation

### Avoidance and mitigation measures

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

### Assessment of impacts and effects

#### *Resources with direct effects*

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

[127] Employment within businesses has been estimated through a combination of sources, for example, surveys of businesses, the Experian employment dataset, employment floor space and the Homes and Communities Agency (HCA) Employment Densities Guide 3rd Edition (2015). The estimate is calculated using standard employment density ratios and estimates of floor areas and may vary significantly from actual employment at the sites.

### *Operational employment*

12.5.3 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.

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

## Other mitigation measures

12.5.5 Any further mitigation measures will be reported in the formal ES.

## Summary of likely residual significant effects

12.5.6 Any likely residual significant socio-economic effects will be reported in the formal ES.

## Monitoring

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

There are no area-specific requirements for monitoring socio-economic effects during the operation of the Proposed Scheme in the Broomedge to Glazebrook area.

# 13 Sound, noise and vibration

## 13.1 Introduction

13.1.1 This section reports the initial assessment of the noise and vibration likely significant effects arising from the construction and operation of the Proposed Scheme within the Broomedge to Glazebrook area on:

- 'residential receptors'; people, primarily where they live, in terms of individual dwellings and on a wider community basis including any shared community open areas[128]; and
- 'non-residential receptors'[129] such as:
  - community facilities including schools, hospitals, places of worship and 'quiet areas'[130]; and
  - commercial properties such as hotels.

13.1.2 The methodology for the assessment of likely significant noise and vibration effects was developed in alignment with Government noise policy[131], planning policy, planning practice guidance on noise (PPGN)[132] and EIA Regulations as described in the Scope and Methodology Report (SMR)[133].

13.1.3 Engagement has been undertaken with Trafford Metropolitan Borough Council (TMBC) and Warrington Borough Council (WBC) with respect to the sound, noise and vibration assessment. This engagement process will continue as part of the development of the Proposed Scheme. The purpose of this engagement has been twofold. Firstly, engagement has been undertaken on a route wide basis covering matters including process, scope, method and the approach to baseline and mitigation strategy. Secondly, local engagement has been undertaken to obtain relevant information regarding residential and non-residential receptors and existing baseline sound levels, and to discuss the development of the mitigation to be included in the Proposed Scheme. Officers from local and county authorities are invited to attend and witness baseline sound measurements.

13.1.4 Maps of the Proposed Scheme in the Broomedge to Glazebrook area showing the location of the key environmental features (Map Series CT-10), key construction features (Map Series CT-05), key operational features (Map Series CT-06) and operational sound, noise and/or vibration impacts and proposed noise mitigation

[128] 'Shared community open areas' are those that the Planning Practice Guidance identifies may partially offset a noise effect experienced by residents at their dwellings and are either a) relatively quiet nearby external amenity spaces for sole use by a limited group of residents as part of the amenity of their dwellings or b) a relatively quiet external publicly accessible amenity space (e.g. park or local green space) that is nearby.
[129] Non-residential receptors with multiple uses would be assessed either based on the most noise sensitive use or would be subject to multiple assessments as appropriate.
[130] 'quiet areas' are defined as either Quiet Areas as identified under the Environmental Noise Regulations 2007 (as amended) or are resources which are prized for providing tranquillity as noted in the NPPF and are therefore designated as such under the relevant local plan or are designated under local plans or neighbourhood development plans as local green spaces.
[131] Noise Policy Statement for England, (2015) Department for Environment, Food and Rural Affairs (Defra)
[132] Department for Communities and Local Government (DCLG) (2014), Planning Practice Guidance – Noise. Available online at: https://www.gov.uk/guidance/noise--2
[133] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

(Map series SV-01), can be found in the Volume 2: MA04 Map Book. Map series SV-01 also presents key 'non-residential receptors'. These receptors will be reviewed and developed further to incorporate, where appropriate, consultation feedback and ongoing stakeholder engagement.

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

## 13.2 Scope, assumptions and limitations

13.2.1 The approach to assessing sound, noise and vibration and identifying envisaged mitigation is outlined in Volume 1 (Section 8 and Section 9) and the SMR.

13.2.2 In this assessment 'sound' is used to describe the acoustic conditions that people experience as a part of their everyday lives. Noise is taken as unwanted sound and hence adverse effects are noise effects and mitigation is, for example, by noise barriers.

13.2.3 Effects can either be temporary from construction or permanent from the operation of the Proposed Scheme. These effects may be direct, resulting from the construction or operation of the Proposed Scheme, and/or indirect, resulting from changes in traffic patterns on existing roads or railways that result from the construction or operation of the Proposed Scheme.

13.2.4 The effects of construction noise and vibration are assessed qualitatively, based on construction compound locations, construction routes, initial construction estimates and professional judgement. No quantitative assessment has been undertaken for the construction of the Proposed Scheme at this stage. The quantitative assessment will be reported in the formal ES.

13.2.5 The effects on operational noise and vibration are assessed quantitatively based on forecast noise emission from the Proposed Scheme combined with outline baseline information and professional judgement. As baseline information is limited at this stage the quantitative assessment including a full baseline will be reported in the formal ES.

## 13.3 Environmental baseline

13.3.1 The SMR describes the three rounds of baseline data collection covering existing sources, modelling and by targeted monitoring. Baseline sound levels will be published in the formal ES.

13.3.2 The area is characterised by a mix of towns, villages, hamlets and isolated residential properties in a predominantly rural setting. The sound environment is generally dominated by local and distant road traffic, overflying aircraft associated with Manchester Airport and local neighbourhood sources, with contributing natural and agricultural sounds.

13.3.3 There are several main roads that contribute to the sound environment within the Broomedge to Glazebrook area: the M62, M56 and the A56 through Lymm and

Broomedge, the A57 Manchester Road through Irlam, Cadishead, Hollins Green and the eastern outskirts of Warrington, and the A6144 through Lymm, Rushgreen and Partington. The southern route of the Manchester to Liverpool (Southern Route) railway line passes through Irlam and to the north of Cadishead.

13.3.4 Sound levels close to these main transportation routes are high during the daytime and are generally lower at night. Sound levels decrease with increasing distance from the main transportation routes.

13.3.5 The effects of vibration at all receptors are being initially assessed using specific thresholds, below which receptors would not generally be adversely affected by vibration. Further information is provided in Volume 1 (Section 8).

13.3.6 The baseline assessment presented in the formal ES will consider current sound levels and how these may change in the future. This will include any changes firstly due to national trends such as road traffic growth and the progressive electrification of road vehicles and secondly due to area specific changes caused either by local committed development and/or noise reduction provided in Important Areas identified in Defra's Noise Action Plans for Agglomerations[134], Roads[135] or Railways[136]. HS2 Ltd will engage with the Competent Authorities responsible for the relevant Important Areas. Map Series SV-01 (Volume 2: MA04 Map Book) shows any noise Important Areas in the Broomedge to Glazebrook area.

## 13.4 Effects arising during construction

### Assumptions and limitations

13.4.1 The construction arrangements that form the basis of the assessment are presented in Section 2.3 of this report, in Volume 1 (Section 8) and in the draft Code of Construction Practice (CoCP)[137]. The assessment focuses on the initial identification of communities that may be affected by construction noise. The formal ES will include the assessment of likely significant effects from construction noise and/or vibration on individual receptors and communities.

13.4.2 The assessment takes account of people's sensitivity to noise during the day, evening and night. More stringent criteria are applied during evening and night-time periods, compared to the busier and more active daytime period.

### Avoidance and mitigation measures

13.4.3 The assessment assumes the implementation of the principles and management processes set out in the noise and vibration section of the draft CoCP (Section 13), which are:

- best practicable means (BPM) as defined by the Control of Pollution Act 1974 (CoPA) and Environmental Protection Act 1990 (EPA), which will be applied during

[134] Noise Action Plan: Agglomerations (large urban areas) (2014) Department for Environment, Food and Rural Affairs
[135] Noise Action Plan: Roads (including major roads) (2014) Department for Environment, Food and Rural Affairs
[136] Noise Action Plan: Railways (including major railways) (2014) Department for Environment, Food and Rural Affairs
[137] Supporting document: Draft Code of Construction Practice

construction activities to minimise noise (including vibration) at neighbouring residential properties and other sensitive receptors[138];

- as part of BPM, mitigation measures are applied in the following order:
  - noise and vibration control at source: for example, the selection of quiet and low vibration equipment, review of construction methodology to consider quieter methods, location of equipment on-site, control of working hours, the provision of acoustic enclosures and the use of less intrusive alarms, such as broadband vehicle reversing warnings;
  - screening: for example, local screening of equipment or perimeter hoarding or the use of temporary stockpiles; and
  - where, despite the implementation of BPM, the noise exposure exceeds the criteria defined in the draft CoCP, noise insulation or ultimately temporary re-housing would be offered at qualifying properties.
- lead contractors will seek to obtain prior consent from the relevant local authority under Section 61 of the CoPA for the proposed construction works. The consent application will set out BPM measures to minimise construction noise and vibration, including control of working hours, and provide a further assessment of construction noise and vibration, including confirmation of noise insulation/temporary re-housing provision;
- contractors would undertake and report such monitoring as is necessary to assure and demonstrate compliance with all noise and vibration commitments. Monitoring data would be provided regularly to, and be reviewed by, the nominated undertaker and made available to the local authorities; and
- contractors would be required to comply with the terms of the CoCP and appropriate action would be taken by the nominated undertaker as required to ensure compliance.

13.4.4 Noise insulation or, where appropriate, temporary re-housing would avoid residents of qualifying properties being significantly affected by levels of construction noise inside their dwellings. Work is being undertaken to provide a reasonable worst case estimate of the buildings that are likely to qualify for such measures and the estimate will be reported in the formal ES.

13.4.5 Qualification for noise insulation and temporary re-housing would be confirmed as part of seeking prior consent from the local authority under Section 61 of the CoPA. Qualifying properties would be identified, as required in the draft CoCP so that noise insulation could be installed, or any temporary re-housing provided, before the start of the works predicted to exceed noise insulation or temporary re-housing criteria.

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

## Assessment of impacts and effects

13.4.6 Potential construction airborne noise significant effects could occur at the communities, or those parts of the communities, that are nearest to the Proposed Scheme in the following locations, as a result of the construction works illustrated on Map Series CT-05 (Volume 2: MA04 Map Book):

- Agden: arising during embankment formation, underbridge construction and road realignment/diversion;
- Little Heatley: arising during viaduct construction ;
- Heatley: arising during underbridge construction, viaduct construction, road realignment and/diversion and cutting formation;
- Mossbrow: arising during overbridge construction, road realignment/diversion and embankment formation;
- Warburton: arising during viaduct construction;
- Hollins Green: arising during viaduct construction and embankment formation; and
- Glazebrook: arising during underbridge construction and embankment formation.

13.4.7 Map Series SV01 (Volume 2: MA04 Map Book) shows key non-residential properties that have been identified within the study area as defined in the SMR. Of these, the following are likely to experience significant effects (to be confirmed in the formal ES):

- St Werburg's New Church, Warburton;
- St Helen's C of E Primary School, Hollins Green;
- St Helen's Church, Hollins Green;
- Hollinfare Cemetery;
- Rixton-with-Glazebrook Community Hall, Hollins Green;
- Rixton Methodist Church, Rixton; and
- Glazebrook Methodist Church.

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

13.4.9 Construction traffic on the following local roads has the potential, on a precautionary basis, to cause adverse noise or vibration effects on the nearest parts of residential communities and nearest noise sensitive non-residential receptors:

- Bradshaw Lane from the junction with Mill Lane and Stage Lane to the junction with Wet Gate Lane;

- the B5159 Mill Lane from the junction with the A6144 Paddock Lane to the junction with Stage Lane and Bradshaw Lane;
- Dam Lane from the junction with Dam Head Lane to the junction with School Lane in Hollins Green;
- Dam Head Lane from the junction with the B5212 Glazebrook Lane at Glazebrook to the junction with Dam Lane; and
- the B5212 Glazebrook Lane between the junction with the A57 Manchester Road at Cadishead to the junction with Dam Head Lane at Glazebrook.

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

### Other mitigation measures

13.4.11 Further work is being undertaken to confirm the likely significant effects and identify any site-specific mitigation, or amendment to construction routes considered necessary in addition to the general measures set out in the draft CoCP. Any site-specific mitigation will be presented in the formal ES and would include an estimate of the number of properties that may qualify for noise insulation or temporary re-housing under provisions set out in the draft CoCP.

### Summary of likely residual significant effects

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

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

## 13.5 Effects arising from operation

### Assumptions and limitations

#### *Local assumptions*

13.5.1 The assessment of the effects of noise and vibration from the operation of the Proposed Scheme is based on the envisaged design as described in Section 2.2 of this report and in Volume 1 (Sections 4 and 8) and the highest likely train flows, assuming the service pattern including Phase One and Phase Two services. The expected passenger service frequency for Phase 2b is described in Volume 1 (Section 4) and as outlined below for the Broomedge to Glazebrook area.

13.5.2 Passenger services will start at or after 05:00 from the terminal stations. In this area, with Phase One and Phase Two in operation, after 05:00 services will progressively increase to four trains per hour in each direction on the main lines with an operating speed of 330kph for 90% of services and 360kph for 10% of services at the southern end of the Broomedge to Glazebrook area progressively reducing to around 250kph for all services at the northern end. This number of services is assumed to operate

every hour from 07:00 to 21:00. The number of services will progressively decrease after 21:00 and the last service will arrive at terminal stations by midnight. Further information is presented in Volume 1 (Section 4).

## Avoidance and mitigation measures

13.5.3 The development of the Proposed Scheme alignment has sought to reduce noise impact insofar as reasonably practicable.

13.5.4 Envisaged avoidance and mitigation measures that apply route-wide are described in Volume 1 (Section 9).

### *Airborne noise*

13.5.5 Through the procurement process for the trains and the track, the use of proven international technology will enable the railway to be quieter than implied by current minimum European standards. Details of operational train noise will be provided in the formal ES. This will include reduction of aerodynamic noise from the pantograph that otherwise would occur above 300kph (186mph) with current pantograph designs, drawing on proven technology in use in East Asia where reasonably practicable. Overall it is assumed that proven international technology would reduce noise emissions by approximately 3dB at 360kph (225mph) compared to the current minimum European standards[139].

13.5.6 The Proposed Scheme would incorporate noise barriers, in the form of either landscape earthworks and/or noise fence barriers to avoid or reduce significant adverse airborne noise effects. The assessment has been based on the assumption that noise fence barriers are acoustically absorbent on the railway side and are located 5m from the outer rail. The envisaged noise barrier locations based upon the currently available information are shown on Map Series SV-01 (Volume 2: MA04 Map Book) and described in Section 2.2.

13.5.7 In practice, barriers may differ from this description while maintaining the required acoustic performance. For example, where noise barriers are in the form of landscape earthworks, they would need to be higher above rail level to achieve similar noise attenuation to the noise fence barrier because the crest of the earthwork would be further than 5m from the outer rail.

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

13.5.9 As required by statute, noise insulation measures would be offered for qualifying buildings as defined in the Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996 and the Noise Insulation Regulations 1975 ('the NI Regulations'). Additionally, HS2 Ltd will apply more onerous criteria, to provide the same mitigation as defined in 'the NI Regulations' at residential buildings where[140]

[139] Technical Specification for Interoperability (TSI) Noise – EU Commission Regulation No 1304/2014
[140] Following Government's National Planning Practice Guidance https://www.gov.uk/government/collections/planning-practice-guidance

noise from the use of the Proposed Scheme measured outside a dwelling exceeds the Interim Target defined by the World Health Organization's (WHO) Night Noise Guidelines for Europe[141] or the maximum noise level criteria[142] defined in the SMR. Noise insulation is designed to avoid residents experiencing any residual significant effect on health and quality of life from resulting noise inside their dwelling.

### *Ground-borne noise and vibration*

13.5.10 Significant ground-borne noise or vibration effects would be avoided or reduced through the design of the track and track-bed.

## Assessment of impacts and effects

13.5.11 Map Series SV-01 (Volume 2: MA04 Map Book) indicates the likely long-term daytime noise level (defined as the equivalent continuous sound level from 07:00 to 23:00 or LpAeq,day) from HS2 operations alone. The contours are shown in 5dB steps from 50dB to 70dB. With the train flows described in Volume 1, the night-time noise level (defined as the equivalent continuous noise level from 23:00 to 07:00 or LpAeq,night) from the Proposed Scheme would be approximately 10dB lower than the daytime sound level. The 50dB contour, therefore, indicates the distance from the Proposed Scheme at which the night time noise level would be 40dB. This contour represents where adverse noise effects may start to be observed during the day (with respect to annoyance) and night (with respect to sleep disturbance). With regard to sleep disturbance the assessment also takes account of the maximum noise levels generated by each train pass by as defined in the SMR.

13.5.12 The potential for noise effects that are considered significant on a community basis in areas between the 50dB and 65dB daytime noise contours, or 40dB and 55dB night-time contours, is dependent on the baseline in that area and the change in level brought about by the Proposed Scheme. Baseline information will be confirmed in the formal ES.

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

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

## Other mitigation measures

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

## Summary of likely residual significant effects

13.5.16 Mitigation, including landscape earthworks and noise fence barriers, described in Volume 1 (Section 9), section 2.2 and presented in Map Series SV-01 (Volume 2: MA04 Map Book) and Map Series CT-06 (Volume 2: MA04 Map Book), would substantially

[141] World Health Organization (2010), *Night time Noise Guidelines for Europe*
[142] Dependent on the number of train passes

reduce the potential airborne noise effects that would otherwise arise from the Proposed Scheme. It is anticipated that the mitigation would avoid likely significant adverse effects due to airborne operational noise on the majority of receptors and communities.

13.5.17 Taking account of the avoidance and mitigation measures this initial assessment has identified effects on a precautionary basis with the potential to be considered significant on a community basis due to increased airborne noise levels in line with the SMR at or around:

- Agden: occupants of residential properties on Spring Lane, Warrington Lane and Agden Lane, located closest to the route of the Proposed Scheme, identified by MA04-C01 on Map SV-01-312b (Volume 2: MA04 Map Book);
- Little Heatley: occupants of residential properties on Wet Gate Lane, located closest to the Proposed Scheme, identified by MA04-C02 on Map SV-01-313 (Volume 2: MA04 Map Book);
- Hollins Green: occupants of residential properties on Dam Lane, Manchester Road, School Lane and The Weint, located closest to the Proposed Scheme, identified by MA04-C03 on Map SV-01-314a (Volume 2: MA04 Map Book); and
- Glazebrook: occupants of residential properties on Bank Street, located closest to the Proposed Scheme, identified by MA04-C04 on Map SV-01-314a (Volume 2: MA04 Map Book).

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

13.5.19 Map Series SV01 (Volume 2: MA04 Map Book) shows key non-residential properties for the assessment of operational airborne noise impacts in the formal ES. Of these, the following are likely to experience significant effects:

- St Helen's Church, Hollins Green;
- Hollinfare Cemetery;
- Glazebrook Methodist Church; and
- St Helen's C of E Primary School, Hollins Green.

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

13.5.21 HS2 Ltd will continue to seek reasonably practicable measures to further reduce or avoid these significant effects. In doing so HS2 Ltd will continue to engage with stakeholders to fully understand the potentially affected receptor, its use and the benefit of the measures.

## Monitoring

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

13.5.23 Operational noise and vibration monitoring would be carried out at different times during the lifetime of the Proposed Scheme at a combination of carefully selected monitoring locations including: adjacent or attached to moving vehicles; at fixed positions or in the vicinity of individual assets; and locations within the surrounding areas and communities alongside the railway corridor.

13.5.24 The expected noise and vibration performance of the Proposed Scheme, operational noise and vibration measurement data, associated asset information, description of corrective actions, results of measured performance compared to expected conditions, and monitoring reports would be shared with the relevant local authorities at appropriate intervals.

# 14 Traffic and transport

## 14.1 Introduction

14.1.1 This section considers the likely impacts on all forms of transport and the potential likely significant effects identified to date on transport users arising from the construction and operation of the Proposed Scheme through the Broomedge to Glazebrook area.

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

14.1.3 Maps showing the location of the key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2: MA04 Map Book.

## 14.2 Scope, assumptions and limitations

14.2.1 The scope, key assumptions and limitations for the traffic and transport assessment are set out in Volume 1 (Section 8) and the Scope and Methodology Report (SMR)[143].

14.2.2 The study area for traffic and transport includes the communities of Agden, Birchwood, Cadishead, Irlam, Lymm, Partington, Rixton-with-Glazebrook and Warburton together with Glazebrook Station, Birchwood Station and Irlam Station.

14.2.3 The study area also includes all roads potentially affected by the Proposed Scheme. The strategic roads in this area are: the M6 and the M62.

14.2.4 The local roads in the study area are: the A57 Manchester Road/Cadishead Way, the A6144 Mill Lane/Bent Lane/Paddock Lane/Warburton Lane/Manchester Road/Carrington Lane, the B5159 Mill Lane, the B5212 Glazebrook Lane, Agden Lane, Bradshaw Lane, Dam Head Lane, Dam Lane, Manchester Road (Hollins Green), and Manchester Road (Partington).

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

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

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

## 14.3 Environmental baseline

### Existing baseline

14.3.1 Existing conditions in the study area have been determined through site visits, traffic and transport surveys, liaison with WBC, SaCC, TMBC and Highways England (including provision of information on public transport, public rights of way (PRoW) and accident data) and desktop analysis.

#### *Surveys*

14.3.2 Traffic surveys, comprising junction turning counts and queue surveys and automatic traffic counts, were undertaken in June, July and November 2017. These data have been supplemented by existing traffic data from other sources, including from WBC, SaCC, TMBC and Highways England. Assessment of the data indicates that the peak hours in the area are 07:30-08:30 and 16:30-17:30. However, there are only small differences (typically less than 3%) between the observed peak hours and the periods 08:00-09:00 and 17:00-18:00, which are the periods when HS2 construction traffic movements and workforce arrivals and departures would have the maximum impact. Consequently, the periods 08:00-09:00 and 17:00-18:00 have been used as the assessment hours representing a reasonable worst case.

14.3.3 PRoW surveys were undertaken in August and November 2017 to establish their nature and usage by non-motorised users (pedestrians, cyclists and equestrians). The surveys included PRoW and roads that would cross the route of the Proposed Scheme, and any additional PRoW and roads that may be affected by the Proposed Scheme. The majority of the PRoW surveys were undertaken during the weekend, at times when recreational use is expected to be highest, but where routes are likely to be used for non-leisure uses such as commuting, surveys were undertaken on a weekday.

#### *Strategic and local highway network*

14.3.4 The strategic routes that pass through the area are: the M6 to the west of the Proposed Scheme, and the M62 that runs in an east-west direction. The strategic road network in and around the Broomedge to Glazebrook area is busy at peak times and delays can be experienced.

14.3.5 The local roads that could be affected by the Proposed Scheme include: the A56 Lymm Road, the A57 Manchester Road/Cadishead Way, the A6144 Mill Lane/Bent Lane/Paddock Lane/Warburton Lane/Manchester Road/Carrington Lane, the B5159 Mill Lane, the B5212 Glazebrook Lane, Agden Lane, Bradshaw Lane, Dam Head Lane, Dam Lane, Manchester Road (Hollins Green), and Manchester Road (Partington). The local road network in this area generally operates well although some localised delays can be experienced, particularly at peak times.

14.3.6 Relevant accident data for the road network subject to assessment have been obtained from the Department for Transport[144]. Data for the three year period

[144] STAT19 Road Safety Data 2014-16 Department for Transport

(2014-2016) have been assessed and any identified clusters (i.e. where there are nine or more accidents in the three year period) have been examined.

14.3.7 One accident cluster was identified within the Broomedge to Glazebrook area. This is the A57 Manchester Road (between the M6 - Moat Lane) nine accidents, including one fatality and two with serious casualties.

14.3.8 The route of the Proposed Scheme would cross two roads with footways within the Broomedge to Glazebrook area. These are: the A6144 Paddock Lane and the A57 Manchester Road.

### *Parking and loading*

14.3.9 There is no parking or loading identified in the Broomedge to Glazebrook area that is expected to be impacted by the Proposed Scheme. Consequently, this topic is not considered further in this assessment.

### *Public transport network*

14.3.10 Two bus routes operate on two roads that are crossed by the route of the Proposed Scheme in the Broomedge to Glazebrook area. There are also bus stops primarily located to serve the main built up area. The bus routes that could be affected by the Proposed Scheme include:

- Route 100 (Warrington – The Trafford Centre – Manchester) on the A57 Manchester Road; and
- Route 5 (Warrington - Warburton - Altrincham) on the A6144 Paddock Lane.

14.3.11 The Liverpool to Manchester (via Warrington Central) railway line would be crossed by the Proposed Scheme.

14.3.12 National and local rail services are accessible via Glazebrook, Birchwood and Irlam stations. Glazebrook, Birchwood and Irlam stations provide access to services to Liverpool Lime Street and Manchester Piccadilly and range of other local stations.

### *Non-motorised users*

14.3.13 There are pedestrian footways adjacent to many of the roads in the built up areas of Agden, Birchwood, Cadishead, Irlam, Lymm, Partington, Rixton-with-Glazebrook and Warburton. Footways vary in width and condition within these areas. Where there is no formal footway provision adjacent to a road, non-motorised user numbers are generally low.

14.3.14 The route of the Proposed Scheme would cross the route of 12 PRoW within the Broomedge to Glazebrook area that could be affected either temporarily or permanently due to, for example, temporary diversion of PRoW during construction and permanent diversions or upgrades, including for maintenance access to the Proposed Scheme. The surveys undertaken to inform the assessment showed that there were fewer than 10 people a day recorded on six of the PRoW. The routes with the greatest usage during the survey day were: National Cycle Route 62/Trans Pennine Trail which was used by 93 pedestrians and 181 cyclists; Cheshire Ring Canal Walk, running parallel to Warrington Lane, which was used by 164 pedestrians and 49

cyclists; and the PRoW Rixton-with-Glazebrook Footpath 7 north of Hollinfare cemetery (north west of Manchester Road), which was used by 89 pedestrians and six cyclists.

14.3.15 In the Broomedge to Glazebrook area, National Route 62 (part of the National Cycle Network) crosses the Proposed Scheme through the area.

### *Waterways and canals*

14.3.16 There are two navigable waterways in the Broomedge to Glazebrook area. The Manchester Ship Canal is located in the centre of the area, running broadly east-west, and the Bridgewater Canal runs through Lymm. Both would be crossed by the Proposed Scheme in the study area.

### *Air transport*

14.3.17 There is no relevant air transport in the Broomedge to Glazebrook area. Consequently, this topic is not considered further in this assessment.

## 14.4 Effects arising during construction

### Avoidance and mitigation measures

14.4.1 The following measures are currently proposed to avoid or reduce effects on transport users:

- new highways (roads and PRoW) would be constructed and operational prior to the permanent closure of any existing highways, insofar as reasonably practicable;
- the majority of roads crossing the route of the Proposed Scheme would be maintained or locally diverted during construction to limit the need for diversion of traffic onto alternative routes;
- traffic management measures would be implemented to limit any disruption;
- road closures would be restricted to overnight and weekends, insofar as reasonably practicable;
- temporary alternative routes for PRoW would be provided during construction, insofar as reasonably practicable, where either the existing or final proposed route is not available;
- where reasonably practicable, site haul routes would be created adjacent to the route of the Proposed Scheme to transport construction materials and equipment to reduce heavy goods vehicle (HGV) movements on public roads with access taken via the main road network;
- HGV would be routed, insofar as reasonably practicable, along the strategic and/or primary road network;

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

14.4.2 Section 14 of the draft Code of Construction Practice (CoCP)[145] includes measures that aim to reduce the adverse impacts and effects on local communities and maintain public access. This includes the impacts of deliveries of construction materials and equipment.

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

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

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

14.4.6 The number of private car trips to and from the construction compounds (both workforce and visitors) would be reduced by encouraging alternative sustainable modes of transport or vehicle sharing. This would be supported by an overarching framework travel plan that would require construction workforce travel plans[146] to be produced that would include a range of potential measures to mitigate the impacts of traffic and transport movements associated with construction of the Proposed Scheme.

[145] Supporting document: Draft Code of Construction Practice

[146] Construction and operational travel plans would promote the use of sustainable transport modes as appropriate to the location and types of trip. They would include measures such as: provision of information on and promotion of public transport services; provision of good cycle and pedestrian facilities; liaison with public transport operators; promotion of car sharing; and the appointment of a travel plan coordinator to ensure suitable measures are in place and are effective.

14.4.7 Where works potentially affect Network Rail assets, disruption to travelling passengers and freight movements would be reduced insofar as reasonably practicable. This includes measures such as:

- programming the construction works to coincide with the possessions that are required and planned by Network Rail for the general maintenance of their railway;
- planning the required construction works so that they can be undertaken in short overnight stages so that passenger services are not disrupted; and
- programming longer closures at the weekend and on bank holidays to reduce insofar as reasonably practicable the number of passengers affected.

## Assessment of impacts and effects

### *Temporary effects*

14.4.8 The traffic and transport impacts during the construction period within the Broomedge to Glazebrook area are likely to include:

- construction vehicle movements to and from the various construction compounds;
- road closures and associated realignments and diversions;
- alternative routes for PRoW; and
- possessions and blockades on the conventional rail network.

14.4.9 The construction assessment has also considered any impacts in the Broomedge to Glazebrook area that arise from construction of the Proposed Scheme in the adjoining community areas.

14.4.10 Construction vehicle movements required to construct the Proposed Scheme would include the delivery of plant and materials, movement of excavated materials and site worker trips. Works would include utilities diversions, earthworks, underpass, viaduct, bridge and highway construction.

14.4.11 Construction activities would be managed from compounds. Details of the construction compounds are provided in Section 2.3. The locations of the compounds are shown in Map Series CT-05 in the Volume 2: MA04 Map Book.

#### Strategic and local highway network

14.4.12 The primary HGV access routes for construction vehicles would be the strategic and/or primary road network with the use of the local road network limited, where reasonably practicable. The construction routes would also provide access to compounds. Where reasonably practicable, HGVs would use the site haul routes alongside the route of the Proposed Scheme to reduce the impact on the local road network. In this area, it is expected that the main construction routes would use:

- the A57 Manchester Road/Liverpool Road/Cadishead Road/Manchester Road;
- the A6144 Mill Lane/Bent Lane/Paddock Lane/Warburton Lane/Manchester Road/Carrington Lane;
- the B5159 Mill Lane;
- the B5212 Glazebrook Lane;
- Bradshaw Lane;
- Dam Head Lane;
- Dam Lane; and
- Manchester Road (Partington)/Manchester Road (Hollins Green).

14.4.13 In addition to increases in traffic flows due to construction traffic, construction of the Proposed Scheme is expected to result in temporary highway closures and diversions or realignments as set out in section 2.3. The works to construct both temporary and permanent highway diversions/realignments could also result in disruption to highway users. In the Broomedge to Glazebrook, all temporary diversions are required as part of a permanent diversion.

14.4.14 Permanent changes to highways are reported under operation.

14.4.15 Changes in traffic have the potential, at some locations, to result in increased travel distance, congestion and delays and increased traffic severance for non-motorised users. The assessment of these changes will be reported in the formal ES.

14.4.16 Assessment of the traffic and transport impacts from utilities works, either separately or in combination with other works, will be reported in the formal ES.

### Accidents and safety

14.4.17 Changes in traffic as a result of the Proposed Scheme could result in changes accident risk. The impacts on accident risk during construction of the Proposed Scheme will be reported in the formal ES.

### Public transport network

14.4.18 It is expected that construction of the Proposed Scheme would require bus route diversions, including bus route 5 (Warrington - Warburton - Altrincham) and route 100 (Warrington – The Trafford Centre – Manchester). This could result in increased journey times and the need to relocate bus stops. Any consequent effects will be reported in the formal ES.

14.4.19 There are interfaces with the existing rail network in this area; in particular, with the Liverpool to Manchester (via Warrington Central) railway line and its rail freight services.

14.4.20 Rail possessions would be required although the majority of the rail possessions would have little or no impact on the operation of rail services as they would be relatively minor localised works, such as work on, and adjacent to, track when not in use.

This could result in disruption to services, although many of the interventions would be combined to reduce the frequency of potential disruption. The effects of railway possessions will be assessed and reported in the formal ES.

### Non-motorised users

14.4.21 The construction works associated with the Proposed Scheme would require the temporary closure or diversion/realignment of PRoW and roads. There would be temporary alternative routes for a number of PRoW in the vicinity of the Proposed Scheme. Where necessary, PRoW would be re-routed around construction compounds.

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

- Agden Footpath 9/2 to be temporarily diverted during construction of Bridgewater Canal Underbridge;
- Cheshire Ring Canal Walk/Lymm Footpath 43 to be temporarily closed to build new underbridge;
- Trans Pennine Trail (National Cycle Route 62) PRoW to be temporarily diverted along the disused railway and Accommodation Access to the north;
- Manchester Ship Canal towpath (including section of Bollin Valley Way) to be temporarily diverted;
- Partington Footpath 6 to be temporarily realigned;
- Warburton Footpath 4 to be temporarily diverted;
- Rixton-with-Glazebrook Footpath 8 to be temporarily diverted; and
- Rixton-with-Glazebrook Footpath 9 to be temporarily diverted to the north of the Manchester Ship Canal viaduct North main compound.

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

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

### Waterways and canals

14.4.25 It is currently expected that the construction of the Proposed Scheme could have an effect upon the Manchester Ship Canal and the Bridgewater Canal in the Broomedge to Glazebrook area where the proposed route would cross the route of the navigable waterways and related construction work might require temporary management of vessels using these sections. The assessment of these will be reported in the formal ES.

### *Permanent effects*

14.4.26 Any permanent effects of construction will be considered in the assessment of operation for traffic and transport. This is because the impacts and effects of ongoing increases in travel demand and the wider impacts and effects of the operations phase need to be considered together.

### Other mitigation measures

14.4.27 The implementation of the measures in the draft CoCP, in combination with the construction workforce travel plan would help mitigate transport-related effects during construction of the Proposed Scheme.

14.4.28 Any further traffic and transport mitigation measures required during the construction of the Proposed Scheme will be considered based on the outcomes of the assessment. These will be reported in the formal ES.

### Summary of likely residual significant effects

14.4.29 Construction of the Proposed Scheme has the potential to lead to additional congestion and delays for road users on a number of routes including: the A57 Manchester Road/Cadishead Way; the A6144 Mill Lane/Bent Lane/Paddock Lane/Warburton Lane/Manchester Road/Carrington Lane; the B5159 Mill Lane; the B5212 Glazebrook Lane; Agden Lane; Bradshaw Lane; Dam Head Lane; Dam Lane; Manchester Road (Hollins Green) and Manchester Road (Partington). Increases in traffic would result in increased traffic severance for non-motorised users of the routes and changes in traffic could result in changes in accident risk.

14.4.30 Construction of the Proposed Scheme is expected to result in diversion of bus routes 5 and 100. This would result in increased journey distance and journey times for the users of these services.

14.4.31 Construction of the Proposed Scheme would require possession of the Liverpool to Manchester (via Warrington Central) railway line and its rail freight services.

14.4.32 Construction of the Proposed Scheme is expected to temporarily divert PRoW Agden Footpath 9/2; National Cycle Route 62 (Trans Pennine Trail) PRoW; Partington Footpath 6; Rixton-with-Glazebrook Footpath 8; Rixton-with-Glazebrook Footpath 9; Lymm Footpath 43/Cheshire Ring Canal Walk; Warburton Footpath 4 and Manchester Ship Canal towpath (including section of Bollin Valley Way).

14.4.33 Construction of the Proposed Scheme is expected to require temporary management of vessels using Manchester Ship Canal and Bridgewater Canal.

14.4.34 The assessment of significant effects in relation to traffic and transport during construction of the Proposed Scheme will be reported in the formal ES.

## 14.5 Effects arising from operation

### Avoidance and mitigation measures

14.5.1 The following measures have been included as part of the design of the Proposed Scheme and would avoid or reduce impacts on transport users:

- reinstatement of roads on or close to their existing alignments, where reasonably practicable; and
- replacement, diversion or realignment of PRoW.

## Assessment of impacts and effects

14.5.2 The following section considers the impacts on traffic and transport and the likely consequential effects resulting from the operational phase of the Proposed Scheme. Operational effects arising from the Proposed Scheme in year 2033 and year 2046 will be reported in the formal ES.

### *Key operation transport issues*

14.5.3 The operation of the Proposed Scheme would be unlikely to have any substantial impacts within this area due to increased traffic, as there are no stations or depots proposed within the Broomedge to Glazebrook area. The maintenance of the Proposed Scheme would generate limited vehicular trips and the effect would not be significant.

14.5.4 The operational impacts are therefore primarily related to permanent diversion, realignment and closure of roads and the diversion or closure of PRoW.

### *Highway network*

#### Strategic and local highway network

14.5.5 The Proposed Scheme would result in a number of permanent highway changes. These include:

- the A6144 Paddock Lane/Warburton Lane permanent diversion;
- Dam Head Lane permanent realignment to south-east; and
- Wet Gate Lane closure of section crossed by Proposed Scheme and realignment to west.

14.5.6 The effects of these changes will be reported in the formal ES.

#### Accidents and safety

14.5.7 Changes in traffic could result in changes in accident risk. Operational effects arising from the Proposed Scheme will be reported in the formal ES

### *Public transport network*

14.5.8 The permanent realignment of roads could increase travel distances for bus passengers on the A6144 Paddock Lane. However, as the realignment is likely to be less than 1km in length, it is not currently expected that there would be significant effects on public transport within the Broomedge to Glazebrook area.

### *Non-motorised users*

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

- Dunham Footpath 8 to be realigned;

- Warburton Footpath 3, south of Moss Brow Farm, to be diverted;
- Warburton Footpath 11, east of Park Cottages, to be realigned north of the viaduct south embankment; and
- Rixton-with-Glazebrook Footpath 14, north of Hollinfare Cemetery, to be realigned under the Glazebrook Moss underbridge on the south side of the railway.

14.5.10 The realignment of some of the PRoW would increase journey distance and time for non-motorised users and may result in significant effects. It is expected that the greatest increases in journey distance (likely to be in excess of an additional 500 m) would affect the users of PRoW Warburton Footpath 3, Warburton Footpath 11 and Rixton-with-Glazebrook Footpath 14. The assessment of these changes will be reported in the formal ES.

### *Waterways and canals*

14.5.11 It is not currently expected that the operation of the Proposed Scheme would have a significant effect on navigable waterways or canals in the Broomedge to Glazebrook area.

## Other mitigation measures

14.5.12 HS2 Ltd is continuing to engage with local highway and transport authorities regarding the need for highway and public transport measures to mitigate the impacts of the Proposed Scheme in the area.

14.5.13 Any further traffic and transport mitigation measures required during the operation of the Proposed Scheme will be considered based on the outcomes of the assessment. These will be reported in the formal ES.

## Summary of likely residual significant effects

14.5.14 Operation of the Proposed Scheme would require the permanent diversion of: A6144 Paddock Lane/Warburton Lane; Dam Head Lane and Wet Gate Lane. Increases in traffic could also result in increased traffic severance for non-motorised users of the routes.

14.5.15 Operation of the Proposed Scheme is expected to require the permanent diversion or closure of: Dunham Footpath 8; Warburton Footpath 3; Warburton Footpath 11 and Rixton-with-Glazebrook Footpath 14.

14.5.16 The assessment of significant effects in relation to traffic and transport during operation of the Proposed Scheme will be reported in the formal ES.

## Monitoring

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

14.5.18 There are no other area-specific monitoring requirements currently proposed for traffic and transport.

# 15 Water resources and flood risk

## 15.1 Introduction

15.1.1 This section provides a description of the current baseline for water resources and flood risk in the Broomedge to Glazebrook area. The likely impacts and significant effects identified to date arising from the construction and operation of the Proposed Scheme on surface water and groundwater bodies and their associated water resources are reported. The likely impacts and significant effects of the Proposed Scheme on flood risk and land drainage are also reported.

15.1.2 Engagement has been undertaken with the Environment Agency, Warrington Borough Council (WBC) and Trafford Metropolitan Borough Council (TMBC), which are both Lead Local Flood Authorities (LLFA), the Canal and River Trust, and United Utilities Limited (the local water and sewerage undertaker). The purpose of this engagement has been to obtain relevant baseline information and to discuss the Proposed Scheme and potential effects. Engagement with these stakeholders will continue as part of the development of the Proposed Scheme.

15.1.3 Maps showing the location of the key environmental features (Map Series CT-10), and the key construction (Map Series CT-05) and key operational (Map Series CT-06) features of the Proposed Scheme can be found in the Volume 2: MA04 Map Book. This map book also includes Map Series WR-01 and WR-02 showing surface water and groundwater baseline information respectively.

15.1.4 Volume 3, Route-wide effects, Water resources and flood risk (Section 16) covers the following at a route-wide level:

- the risk to water resources associated with accidents or spillages from trains during operation of the Proposed Scheme;
- a summary of how the Proposed Scheme aims to demonstrate compliance with the statutory requirements of the Water Framework Directive (WFD); and
- route-wide flood risk issues related to alignment of the Proposed Scheme with the Sequential Test and Exception Test policies in the National Planning Policy Framework (NPPF)[147].

## 15.2 Scope, assumptions and limitations

15.2.1 The scope, assumptions and limitations for the water resources and flood risk assessment are set out in Volume 1 (Section 8) and the Scope and Methodology Report (SMR)[148].

15.2.2 Unless indicated otherwise, the spatial scope of the assessment (the study area) is based upon the identification of surface water and groundwater features within 1km

[147] National Planning Policy Framework, DCLG, 2015.
[148] Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

of the centre line of the route of the Proposed Scheme, as described in Section 2.2 of this report.

15.2.3 This assessment is based on desk study information, including information provided to date by consultees and stakeholders, as well as surveys of accessible water features.

15.2.4 Where surveys have not been undertaken due to land access constraints, a precautionary approach has been adopted in the assessments of receptor value and impact magnitude.

15.2.5 Hydraulic analysis is currently being undertaken of watercourses and key structures within flood risk areas. This includes modelling of Agden Lane Road Drain 1 towards the Bridgewater Canal.

15.2.6 Groundwater levels have been inferred from the available Environment Agency groundwater level monitoring boreholes, historic borehole logs and topographic data, as well as from spring and watercourse locations.

15.2.7 Impacts on biological receptors such as aquatic fauna and flora are assessed in Section 7, Ecology and biodiversity.

15.2.8 The assessments in this working draft ES are based on professional judgement using the information that it currently available. A precautionary approach has been adopted with regard to assessing the potential for adverse impacts to occur. The surveys, analysis and modelling work currently in progress, and the results of the consultation process, will be used to refine the assessments reported in the formal ES.

## 15.3 Environmental baseline

### Existing baseline - water resources and WFD

#### *Surface water*

15.3.1 All surface water bodies in the study area fall within the Mersey Lower or Mersey Upper management catchments of the North West river basin district (RBD).

15.3.2 The river basin management plan[149] identifies the chemical[150] and ecological[151] status of surface water bodies, and the quantitative[152] and chemical[153] status of groundwater bodies within this RBD.

15.3.3 To be compliant with WFD legislation, the Proposed Scheme should not cause deterioration of a water body from its current status; nor prevent future attainment of

[149] Environment Agency (2015), *Water for life and livelihoods Part 1: North West river basin district: River basin management plan*
[150] The chemical status of surface waters reflects concentrations of priority and hazardous substances present
[151] 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 Section 7, Ecology and biodiversity;
- 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
[152] 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
[153] The chemical status of a groundwater body reflects effects on drinking water protected areas, its general quality, the importance of water quality within the water body for GWDTEs and surface water interactions and whether there are intrusions of poor quality groundwater present

good status where this has not already been achieved. The Proposed Scheme should also avoid adverse impacts on protected or priority species and habitats.

15.3.4 Specialist field surveys are being undertaken, where access is available. Receptor values will be adjusted to reflect the outputs from these surveys, in close consultation with the Environment Agency. In the absence of field surveys, surface water bodies, other than minor ponds and ditches, have been identified within this assessment as being of either high or very high value on a precautionary basis.

15.3.5 Summary information relating to the surface water bodies potentially affected by the Proposed Scheme within the study area is provided in Table 24. The receptor value attributed to each individual water body is based on the methodologies set out in the SMR.

Table 24: Surface water body receptors

| **Water body name and location[154]** | **Designation** | **Q95 value ($m^3/s$)[155]** | **Receptor value** | **Parent WFD water body name and identification number[156]** | **Current WFD status/Objective[157]** |
|---|---|---|---|---|---|
| Agden Lane Road Drain 1 WR-01-305b D7 | Ordinary watercourse | <0.002 | Low | Bollin (Ashley Mill to Manchester Ship Canal)<br>GB112069061382 | Moderate/Moderate by 2015 |
| Bridgewater Canal<br>WR-01-305b E7 | Canal | n/a | Very high | Bridgewater Canal<br>GB71210001 | Moderate/Good by 2027 |
| River Bollin<br>WR-01-305b F7 | Main river | 0.5 | Very high | Bollin (Ashley Mill to Manchester Ship Canal)<br>GB112069061382 | Moderate/Moderate by 2015 |
| Tributary of the Manchester Ship Canal 2<br>WR-01-305b H7 | Main river | 0.003 | Moderate | Mersey/Manchester Ship Canal (Irwell/Manchester Ship Canal to Bollin)<br>GB112069061011 | Moderate/Moderate by 2015 |
| Manchester Ship Canal[158]<br>WR-01-305b I7 | Canalised river | n/a | Very high | | |
| Red Brook<br>WR-01-305b I7 | Main river | 0.09 | High | Sinderland Brook<br>GB112069060980 | Moderate/Moderate by 2015 |
| Tributary of Glaze Brook 1[159]<br>WR-01-305b J7 | Main river | <0.002 | Low | Glaze<br>GB112069061420 | Poor/Poor by 2015 |

[154] The feature locations are indicated by the grid coordinates on the relevant Volume 2: MA04 Map Book figure (in this case WR-01).
[155] This is the flow within the watercourse that is exceeded for 95% of the time
[156] The Environment Agency has attributed each surface water and groundwater body a unique water body identification (ID) number
[157] Status and objectives are based on those set out in the 2015 River basin management plan.
[158] The Manchester Ship Canal is a canalised section of the River Mersey in the study area. It is referred to as the Manchester Ship Canal throughout this report
[159] Also known as Hollins Green Brook ('water name' on Digital River Network)

| | | | | | |
|---|---|---|---|---|---|
| Tributary of Glaze Brook 2<br><br>WR-01-306a D7 | Ordinary watercourse | <0.002 | Low | | |

### Abstractions and permitted discharges (surface water)

15.3.6 There are four licensed surface water abstractions in the study area. None of these are located within the land required for the construction and operation of the Proposed Scheme. These are considered high value receptors.

15.3.7 Records of private unlicensed surface water abstractions, which comprise those for quantities less than 20m3 per day, have been obtained from the local authorities. These data indicate that there are no registered private unlicensed surface water abstractions within the study area. As there is no obligation to register private water supplies, unregistered private surface water supplies may be present. Private water supplies would be assessed as high value receptors unless details obtained from the owner indicate otherwise.

15.3.8 There are 20 consented discharges to surface waters within the study area[160], none of which are within the land required for the Proposed Scheme. These have been assessed as being receptors of low value.

## *Groundwater*

15.3.9 The geology of the study area is described in Section 10, Land quality, and the superficial and bedrock hydrogeology is summarised in Table 25. Unless stated otherwise, the geological groups listed would all be crossed by the Proposed Scheme. Table 25 also identifies the receptor values attributed to each groundwater receptor based on the methodologies set out in the SMR.

Table 25: Summary of geology and hydrogeology in the study area

| **Geology[161]** | **Distribution** | **Formation description** | **Aquifer classification** | **WFD body (ID) and current overall status[162]** | **WFD status objective[163]** | **Receptor value** |
|---|---|---|---|---|---|---|
| **Superficial deposits** | | | | | | |
| Peat | Present at the northern end of the study area | Peat | Unproductive | Weaver and Dane Quaternary | Good by 2027 | Moderate |

[160] Note that the number of consents listed in Section 10: Land quality may be different to that stated here. This is because the Water resources and flood risk study area comprises all the land within 1km of the centreline of the Proposed Scheme, whereas the Land quality study area for surface water comprises all land with 250m of the boundary of the Proposed Scheme. The default study area may be extended where potential for wider pathways exists.

[161] In recent years the BGS has revised the nomenclature used to describe the geological materials present in Great Britain, with the publication of a series of lithostratigraphic framework reports. Some of these reports cover an entire geological period e.g. The Carboniferous and others cover a single group e.g. the Triassic Mercia Mudstone. The nomenclature used in these reports supersede the nomenclature introduced in the 1980s. While some traditional names have been retained by this process, many new names have also been generated, and many geological maps have not yet been updated. Some stratigraphic units have been renamed twice in the last 35 years. To reflect this, the previous name used for geological units (if different) is shown in brackets.

[162] As stated in the 2015 River basin management plan

[163] As stated in the 2015 River basin management plan

| Geology[161] | Distribution | Formation description | Aquifer classification | WFD body (ID) and current overall status[162] | WFD status objective[163] | Receptor value |
|---|---|---|---|---|---|---|
| Alluvium | Along the River Bollin, the Glaze Brook, Red Brook and Manchester Ship Canal | Clay, silt, sand and gravel | Secondary A | sand and gravel aquifers (GB41202G991700) Poor | | Moderate |
| Glacial till | At the northern and southern end of the Proposed Scheme | Sandy silty clay with pebbles | Secondary (undifferentiated) | | | Moderate |
| River terrace deposits | Isolated patches on the south side of the valley of the River Bollin | Sand and gravel | Secondary A | | | Moderate |
| Glaciofluvial sheet deposits | Along the valleys of the River Bollin, the Glaze Brook and Manchester Ship Canal | Sand and gravel | Secondary A | | | Moderate |
| Shirdley Hill Sand Formation | Along the Bridgewater Canal and on high ground around Mossbrow and Partington | Sand | Secondary A | | | Moderate |
| **Bedrock** | | | | | | |
| Mercia Mudstone Group – Sidmouth Mudstone Formation– Northwich Halite Member | Present in the base and southern side of the valley of the River Bollin | Halite and mudstone. | Unproductive | Not assessed by the Environment Agency | Not assessed by the Environment Agency | Low |
| Mercia Mudstone Group – Sidmouth Mudstone Formation – Bollin Mudstone Member | Present north of the valley of the River Bollin and south-west of Hollins Green and Glazebrook Moss | Mudstone and siltstone | Secondary B | Not assessed by the Environment Agency | Not assessed by the Environment Agency | Moderate |

| Geology[161] | Distribution | Formation description | Aquifer classification | WFD body (ID) and current overall status[162] | WFD status objective[163] | Receptor value |
|---|---|---|---|---|---|---|
| Mercia Mudstone Group – Tarporley Siltstone Formation | Present in a north-west to south-east trending band south of Glazebrook and Cadishead | Siltstone, mudstone and sandstone | Secondary B | Not assessed by the Environment Agency | Not assessed by the Environment Agency | Moderate |
| Sherwood Sandstone Group – Helsby Sandstone Formation | Present in a band centred on Cadishead and Glazebrook and at the southern boundary of the study area | Pebbly sandstone | Principal | Lower Mersey Basin and Merseyside North Permo-Triassic Sandstone Aquifers (GB41201G101700) Poor status | Good by 2027 | High |

### Superficial deposit aquifers

15.3.10 The basis of the receptor values attributed to the superficial deposit aquifers present within the study area, as shown in Table 25, is outlined briefly as alluvium, river terrace deposits, glaciofluvial sheet deposits, the Shirdley Hill Sand Formation, peat, and glacial till. Although considered unproductive strata, the peat forms part of the wider Weaver and Dane WFD water body. The other superficial deposits form an aquifer system which may be capable of supporting water supplies at a local rather than regional scale and may also form an important source of baseflow to rivers. They have therefore been classified as moderate value receptors.

### Bedrock aquifers

15.3.11 The basis of the receptor values attributed to the bedrock aquifers present within the study area, as shown in Table 25 is outlined briefly as follows:

- the Sherwood Sandstone Group (locally comprising sandstones of the Helsby Sandstone Formation) has been classified as a Principal aquifer by the Environment Agency and is therefore a high value receptor;
- the Mercia Mudstone Group (comprising the Bollin Mudstone Member in the Sidmouth Mudstone Formation, and the Tarporley Siltstone Formation) has traditionally been regarded as predominantly impermeable, or at best a poor aquifer. Limited quantities of groundwater suitable for domestic or agricultural use are, however, occasionally obtainable within this rock formation, and it has therefore been classified as a moderate value receptor; and
- the Northwich Halite Member (which is commercially mined for deep rock salt deposits at Winsford) is classified as unproductive strata and is unlikely to

provide baseflow to rivers or support groundwater abstraction. It has therefore been classified as a low value receptor.

### WFD status of groundwater bodies

15.3.12 A summary of locations, current overall WFD status, and future overall status objectives associated with the designated superficial and bedrock groundwater bodies within the study area is provided in Table 25. The value attributed to each of these receptors is also indicated.

### Abstraction and permitted discharges (groundwater)

15.3.13 There are no groundwater abstractions licensed for public water supply. Source protection zones (SPZ) 3 associated with public water supplies extend into the study area and are crossed by the Proposed Scheme in the northernmost part of the study area.

15.3.14 There are no private groundwater abstraction licences registered in the study area.

15.3.15 Records of private unlicensed groundwater abstractions, which comprise those for quantities less than 20m3 per day, have been obtained from the local authorities. These data indicate that there are no registered private unlicensed groundwater abstractions within the study area. As there is no obligation to register private water supplies, unregistered private groundwater supplies may also be present. Private water supplies would be assessed as high value receptors unless details obtained from the owner indicate otherwise.

15.3.16 There is one consented discharge to groundwater within the study area. This discharge has been assessed as a low value receptor.

### Groundwater - surface water interactions

15.3.17 Desk-based assessment using Ordnance Survey maps and detailed river network data provided by the Environment Agency identified 20 features within the study area that had potential to be springs. Access was possible to inspect six of these features, and they were verified as being minor land drainage features of low value.

15.3.18 The remaining 14 potential spring features that have yet to be inspected are assumed to be high value receptors on a precautionary basis. Three of the potential spring features yet to be inspected are within the land required for the Proposed Scheme, one north-east of Fox Covert and two south and south-west of Church Farm at Glazebrook Moss.

15.3.19 There are six ponds within the land required for the Proposed Scheme. The nature and relative value of these features, the magnitude of the impacts that the Proposed Scheme would have on them, and the mitigation proposed, are outlined in Section 7, Ecology and biodiversity.

#### *Water dependent habitats*

15.3.20 No groundwater dependent designated nature conservation sites have been identified within the study area that have the potential to be affected by the Proposed Scheme.

15.3.21 Holcroft Moss Site of Special Scientific Interest (SSSI) (part of the Manchester Mosses Special Area of Conservation (SAC)) may be dependent on either surface water or groundwater (from the Peat and Helsby Sandstone Formation). The site is located in the Risley to Bamfurlong area (MA05) and is considered in the Volume 2: Community area report MA05, Risley to Bamfurlong.

15.3.22 Risley Moss SSSI (part of the Manchester Mosses Special Area of Conservation (SAC) may also be dependent on surface water or groundwater. The site is located in the Risley to Bamfurlong area (MA05) and as such will be considered in the Volume 2: Community area report MA05, Risley to Bamfurlong.

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

## Existing baseline - flood risk and land drainage

15.3.24 The Environment Agency's Flood map for planning (rivers and sea)[164] has been used to scope the baseline flood risk for flooding from main rivers and ordinary watercourses. These plans define Flood Zone 2 (land assessed as having between a 1 in 100 (1%) and 1 in 1,000 (0.1%) annual probability of river flooding) and Flood Zone 3 (land assessed as having a 1 in 100 (1%) or greater annual probability of river flooding).

15.3.25 The updated Flood map for surface water[165] has been used to scope surface water flood risks. Infrastructure failure flood risks have been scoped using the Environment Agency risks of flooding from reservoirs national dataset[166]. The British Geological Survey's (BGS) Groundwater flooding susceptibility data set[167], has been used to assess the future risk of groundwater flooding.

15.3.26 The following reports were used to help determine the baseline flood risk within the study area:

- Warrington Preliminary Flood Risk Assessment (PFRA) (2017)[168];
- Warrington Strategic Flood Risk Assessment (SFRA) (2008)[169], Manchester City, Salford City and Trafford Council Hybrid SFRA (2010)[170]; and
- Warrington Local Flood Risk Management Strategy (LFRMS) (2014)[171] and Trafford LFRMS (2014)[172].

### *River flooding*

15.3.27 The study area includes substantial areas of floodplain (Flood Zone 2 or 3) associated with the River Bollin and Manchester Ship Canal. Other floodplains that would be crossed by the route of the Proposed Scheme include those associated with Red

[164] https://flood-map-for-planning.service.gov.uk/
[165] https://flood-warning-information.service.gov.uk/long-term-flood-risk/
[166] https://flood-warning-information.service.gov.uk/long-term-flood-risk/
[167] http://www.bgs.ac.uk/products/hydrogeology/groundwaterFlooding.html
[168] Warrington Borough Council (2017), *Warrington Preliminary Flood Risk Assessment (PFRA)*
[169] JBA Consulting (2008), *Warrington Strategic Flood Risk Assessment (SFRA)*
[170] JBA Consulting (2010), *Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA*
[171] Warrington Borough Council (2017) *Warrington Local Flood Risk Management Strategy (LFRMS)*
[172] Trafford Council (2014), *Trafford Local Flood Risk Management Strategy (LFRMS)*

Brook and Tributary of the Manchester Ship Canal 2. Table 26 shows all relevant watercourses within the study area with receptors that would potentially be affected by any changes in flood magnitude. The value of these receptors, based on the definitions in Table 57 of the SMR, is also indicated.

Table 26: River flood risk sources and receptors

| Source | Location description and figure/coordinate[173] | Receptor potentially affected | Receptor value/sensitivity to flooding |
|---|---|---|---|
| River Bollin | River Bollin<br>WR-01-305b F7 | Footpaths | Low |
| | | Cycle track | Low |
| Tributary of the Manchester Ship Canal 2 | Warburton Park Brook<br>WR-01-305b H7 | Residential property | High |
| Red Brook | Red Brook<br>WR-01-305b I7 | Footpath | Low |
| Manchester Ship Canal | Manchester Ship Canal<br>WR-01-305b I7 | Telecommunication mast | Very high |
| | | Towpath | Low |
| | | A57 | Moderate |
| | | Mytholme Avenue | Moderate |
| | | Residential properties along Mytholme Avenue | High |
| | | Liverpool Road | Moderate |
| | | Rosebank Road | Moderate |
| | | Commercial property | Moderate |
| | | Industrial support (tanks) | Moderate |

### *Surface water flooding*

15.3.28 There are numerous areas that are susceptible to surface water flooding within the study area. The key sources and receptors with potential to be affected are shown in Table 27. The value of these receptors, based on Table 57 of the SMR, is also indicated.

[173] This is the location at which the source intersects the Proposed Scheme, as indicated by the grid coordinates on the relevant Volume 2: MA04 Map Book figure (in this case WR-01).

Table 27: Surface water flood risk sources and receptors

| Source | Location description and figure/coordinate[174] | Receptor potentially affected | Receptor value |
|---|---|---|---|
| Surface water flow path at Agden Bridge | Agden Bridge<br>WR-01-305b E7 | Residential properties along Warrington Lane | High |
| | | Warrington Lane | Moderate |
| | Agden Lane<br>WR-01-305b D7 | Residential property | High |
| | | Agden Lane | Moderate |
| Tributary of Glaze Brook 1 (Hollins Green Brook) | Cemetery<br>WR-01-306a B7 | Dam Head Lane | Moderate |

### *Artificial water bodies*

15.3.29 Flooding from artificial water bodies may occur due to failure of an impounding structure, such as a dam or canal embankment. Artificial water bodies with potential implications for flood risk within the study area include Tatton Mere, Melchett Mere, Radnor Mere, Lamaload Reservoir, and Trentabank Reservoir. Other artificial water bodies outside of the study area, but with potential to affect flood risks of relevance to the Proposed Scheme are Kinder Reservoir, Fernice Reservoir, Torside Reservoir, Rhodeswood Reservoir, Valehouse Reservoir, Bottoms Reservoir, Arnfield Reservoir and Sale Water Park. However, as these are large raised reservoir or impounded water bodies[175], subject to the requirements of reservoir safety legislation[176], the inundation risk posed by them is considered negligible.

### *Groundwater flooding*

15.3.30 Information related to historical incidents of groundwater flooding in the Broomedge to Glazebrook area is included in the Warrington SFRA169 and LFRMS171, as well as in the Manchester City, Salford City and Trafford SFRA170 and LFRMS172. These documents state that there is no history of groundwater flooding within the study area.

15.3.31 The BGS Groundwater flooding susceptibility data set indicates that there is some potential for groundwater flooding to occur in the River Bollin and Manchester Ship Canal floodplains and where the Proposed Scheme is underlain by susceptible superficial deposits (glacial till) in Little Heatley and Warburton.

[174] This is the location at which the source intersects the Proposed Scheme, as indicated by the grid coordinates on the relevant Volume 2: MA04 Map Book figure (in this case WR-01)
[175] Meres listed have been analysed for dam breach by the Environment Agency and are included in the Reservoir Flood Maps dataset
[176] https://www.gov.uk/guidance/reservoirs-owner-and-operator-requirements

### *Land drainage*

15.3.32 Existing topography, soils and land drainage systems within the study area are described in Section 4, Agriculture, forestry and soils. The rivers and watercourses within the area are connected to an extensive network of existing open drains. Subsurface drainage systems are also likely to be present in fields used for agriculture. The land drainage function of these systems, which is important for crop productivity, is potentially sensitive to increases in water levels within the receiving watercourses.

## 15.4 Effects arising during construction

### Avoidance and mitigation measures

15.4.1 The principal strategy adopted to limit the temporary and permanent effects of the Proposed Scheme is through avoidance of sensitive receptors wherever reasonably practicable. Where receptors could not be avoided, mitigation measures have been incorporated where appropriate and reasonably practicable, to limit the potential effects. Section 16 of the draft CoCP[177] includes a range of mitigation measures that aim to reduce construction impacts as far as is reasonably practicable. The avoidance and mitigation measures that are of particular relevance to water resources and flood risk during construction are described in the following sections of this report.

### *Water resources and WFD*

15.4.2 The avoidance of sensitive receptors has reduced the risks associated with the Proposed Scheme not complying with the requirements of the WFD. Examples of this strategy include:

- avoidance of channels and floodplain areas, where reasonably practicable – the route of the Proposed Scheme will avoid passing along river or stream valleys, such as that of the River Bollin, Manchester Ship Canal , Red Brook and their associated floodplains. Instead it would pass over these larger watercourses on viaducts spanning the floodplain, with piers set back from the channel;
- avoidance, where reasonably practicable, of water dependent habitats, including natural springs that can play a key role in the hydrology and hydrogeology of such ecosystems; and
- avoidance, where reasonably practicable, of major public water supplies and smaller licensed and unlicensed abstractions of surface water and groundwater.

15.4.3 The presence of any unregistered private water supplies, their function and the means of protecting or if necessary replacing them would be discussed with any landowners potentially affected by the Proposed Scheme.

[177] Supporting document: Draft Code of Construction Practice

15.4.4 The temporary works shown on Map Series CT-05 in the Volume 2: MA04 Map Book have been informed by a detailed consideration of the water resources constraints and have sought to avoid sensitive features wherever reasonably practicable.

15.4.5 Watercourse realignments are proposed at the following locations: Red Brook and Tributary of the Manchester Ship Canal 2. The aim will be to design these with equivalent hydraulic capacity to the existing channels. The Proposed Scheme would also aim to ensure that field subsurface drainage systems can be adapted to discharge into the new channel. Where such watercourses are natural channels, the design aim will be to incorporate appropriate features to retain and, where reasonably practicable, enhance their hydromorphological condition[178].

15.4.6 Watercourse diversions, which would result in changes in flow regime within discrete sections of channel, have been avoided wherever possible. There are no diversions proposed within this study area.

15.4.7 For watercourses that are not in their natural condition, the design aim for realignments will be to incorporate measures, where reasonably practicable, to improve their hydromorphological condition, provided this is compatible with their flood risk and land drainage functions.

15.4.8 The design of infrastructure required within or in proximity to an existing channel (including bridge abutments, intermediate piers and outfalls) will aim to reduce impacts on the natural hydromorphology of watercourse channels, as far as is reasonably practicable

15.4.9 The draft CoCP includes requirements to protect water bodies and their associated water resources from the potential impacts of pollution from construction site runoff, including where appropriate:

- provision of maps showing sensitive areas and buffer zones where no pollutants are to be stored or used; and
- preparation of method statements for silt management, site drainage at compounds and satellite compounds, for the storage and control of oils and chemicals and the prevention of accidental spillages, in consultation with the Environment Agency, and if appropriate, the LLFA and other relevant authorities as part of the approvals process. These method statements will cover, where applicable:
  - the avoidance of discharges of site runoff to ditches, watercourses, drains, sewers or soakaways without the prior approval of the appropriate authority;
  - measures to prevent silt-laden runoff and other pollutants entering the water environment; and

[178] "Hydromorphological condition" reflects the extent to which water flow, sediment composition and movement, continuity (in rivers) and the structure of physical habitats departs from that expected of a natural river or stream system

- restrictions or controls on excavation within watercourses to limit effects on water quality, sedimentation, fisheries and aquatic ecology.

15.4.10 Method statements will be required for all watercourse crossings and channel realignments required for site haul routes. The method statements will describe how potential changes to flood risk, water quality and channel hydromorphology will be managed during the establishment, use and decommissioning of all site haul routes.

15.4.11 Permanent culverts proposed on the smaller watercourse crossings within this study area include Agden Lane Road Drain 1, the surface water pathway at Paddock Lane, and the Tributary of Glaze Brook 2 at Glazebrook Moss. There may be localised realignments associated with these culverts. The detailed design of these culverts will be developed in general accordance with Construction Industry Research and Information Association (CIRIA) and Environment Agency guidance and in consultation with Environment Agency specialists. The design has sought to mitigate the impact on the hydromorphology of the affected watercourses, as follows:

- drop inlet culverts and inverted siphons have been avoided wherever reasonably practicable and are proposed on minor headwater channels or ditches only;
- culvert lengths have been reduced as far as is reasonably practicable; and
- invert levels will be set below the firm bed of the watercourse to allow a natural substrate to develop along the bed of the culvert.

15.4.12 The wider issues associated with these culverts, and how their detailed design will aim to ensure no deterioration in the status of any of the relevant water bodies WFD quality elements, will be considered within the formal ES.

15.4.13 Existing groundwater abstraction boreholes or monitoring points will be protected from physical damage, insofar as reasonably practicable, including appropriate decommissioning of abandoned boreholes in order to prevent pollution pathways. If boreholes are to be decommissioned and replaced with alternatives, the contractors will follow the latest good practices. This principle will also be applicable to springs potentially affected by the Proposed Scheme, although additional measures may be required to mitigate temporary construction impacts. Wherever reasonably practicable, the design will aim to recreate affected spring features nearby.

15.4.14 Measures will be introduced, as required, to mitigate the temporary and permanent effects on groundwater flows and water quality during excavation and construction of foundations and cuttings as far as is reasonably practicable. The types of measure likely to be adopted could include:

- installation of cut-off[179] structures around excavations;
- ensuring cut-off structures are driven to sufficient depths to meet an underlying strata or zone of lower permeability;

[179] Impermeable barrier preventing water flow

- promoting groundwater recharge, such as discharging pumped water to recharge trenches around excavations to maintain baseline groundwater and surface water conditions; and

- incorporating passive bypasses within the design, which could comprise a 'blanket' of permeable material, such as gravel, placed around temporary structures allowing groundwater to bypass the below-ground works, without a rise in groundwater levels on the upstream side;

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

### *Flood risk and land drainage*

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

- the floodplain avoidance strategy will ensure that the impacts on flood flows within rivers and streams, and their floodplains, will be limited to those associated with the intermediate pier structures on the viaducts and the new road connecting Bank Street and Dam Head Lane which would cross over Tributary of Glaze Brook 1 (Hollins Green Brook). The Proposed Scheme includes replacement floodplain storage areas to replace losses associated with the piers and highway realignment;

- the temporary works shown on Map Series CT-05 in the Volume 2: MA04 Map Book have been informed by a detailed consideration of the flood risk constraints and have sought to avoid flood zones wherever reasonably practicable;

- provision has been made to pass surface water runoff and land drainage flows beneath sections of raised embankment that will cross surface water flow paths where reasonably practicable. This will be achieved using perimeter drainage and culverts, with their inverts set below the likely level of any upstream field subsurface drainage systems;

- in locations where the route of the Proposed Scheme will cross watercourses, the design aim is for structures to accommodate flood flows up to and including the 1 in 100 (1%) annual probability flood with an allowance for climate change based on latest guidance issued by the Environment Agency[180];

- runoff from the footprint of the infrastructure could occur more rapidly post-construction due to steeper slope angles and the permeability of the newly-created surfaces. The design of drainage systems aims to ensure that there will be no 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;

[180] Environment Agency (2016) *Adapting to Climate Change. Advice for Flood and Coastal Erosion Risk Management Authorities*

- balancing ponds for new sections of highway and railway drainage have been sized on a precautionary basis, pending more detailed information about the permeability and runoff characteristics of existing and proposed ground surfaces;
- where the Proposed Scheme will pass in cutting, drainage measures will 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 will also be drained to the catchments to which this water would naturally drain, avoiding transfer of water from one water body to another, which could increase flood risk or impact on land drainage systems; and
- measures will be introduced to reduce any potentially significant effects on groundwater flood risk as far as is reasonably practicable, including the incorporation of passive hydraulic bypasses at cuttings and other below ground structures. These could for example comprise a 'blanket' of permeable material such as gravel.

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

- preparation of flood risk assessments and method statements for temporary works, including main construction and satellite compound drainage, watercourse crossings and realignments and temporary realignments in consultation with the Environment Agency, and where applicable, the LLFA and other relevant regulators;
- location of storage, machinery, equipment and temporary buildings outside flood risk areas where reasonably practicable;
- construction of outfalls during periods of low flow to reduce the risk of scour and erosion;
- design of temporary watercourse realignments with equivalent hydraulic capacity to the existing channels, ensuring that field subsurface drainage systems can be adapted to discharge into the new channel; and
- having regard to the requirement for construction activities to avoid any increases in flood risk to vulnerable receptors.

15.4.18 In accordance with Section 16 of the draft CoCP, monitoring will also be undertaken in consultation with the Environment Agency and, where applicable, the LLFA, to ensure that temporary structures are installed, maintained and removed in accordance with the relevant environmental approvals and that impact on existing land drainage systems are managed appropriately.

## Assessment of impacts and effects

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

### *Temporary effects – water resources and WFD*

#### Surface water

15.4.20 Potential temporary impacts on surface water quality, due to site runoff and increased pollution risk, are a key concern during construction and have the potential to affect abstractions and the water environment more generally. However, the practices outlined in the draft CoCP are considered adequate to mitigate any impacts, such that there are unlikely to be any significant effects.

#### Groundwater

*Aquifers*

15.4.21 The proposed Warburton cutting in the study area would intersect the Shirdley Hill Sand Formation and the glaciofluvial deposits Secondary A aquifers, and the glacial till Secondary (undifferentiated) aquifer. Whilst there could be minor localised impacts, the implementation of the measures outlined in the draft CoCP would mean that any effects on the overall status of these aquifers would not be significant.

15.4.22 Where cuttings could affect local receptors, such as groundwater abstractions or springs, this is reported in the sections below.

*Abstractions*

15.4.23 No licensed groundwater abstractions have been identified in the study area.

*Groundwater - surface water interactions*

15.4.24 During the construction of the Glazebrook embankment there is the potential for minor water quality impacts on two springs located within the land required for the Proposed Scheme, 170m and 220m to the south-west and south of Church Farm, Glazebrook Moss. These would be temporary moderate adverse effects, which are significant.

#### Water dependent habitats

15.4.25 No temporary impacts on water dependent habitats are anticipated in this study area as a result of construction of the Proposed Scheme.

15.4.26 Any temporary impacts from construction in this study area on Holcroft Moss SSSI and Risley Moss SSSI (located in the Risley to Bamfurlong area (MA05)) are discussed in the Volume 2: Community area report MA05, Risley to Bamfurlong.

### *Temporary effects - flood risk and land drainage*

15.4.27 Construction of the River Bollin West viaduct and the Manchester Ship Canal viaduct (which also covers Red Brook and Tributary of Glaze Brook 1/Hollins Green Brook) would require temporary working within flood zones. This would include the site haul route that involves spanning the main channels of the River Bollin, Manchester Ship Canal and tributary watercourses. Construction sequencing and temporary works design would be carefully considered and assessed in terms of potential impacts on flood risk. Method statements detailing how these works would be undertaken would be produced by the nominated undertaker in consultation with the Environment Agency and the LLFA. It is not anticipated that these temporary activities would result in significant effects related to flood risk and land drainage.

### *Permanent effects – water resources and WFD*

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

#### Surface water

15.4.29 The assessment has not identified any permanent significant effects on surface water.

#### Groundwater

*Aquifers*

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

*Abstractions*

15.4.31 The assessment has not identified any permanent significant effects on groundwater abstractions.

*Groundwater - surface water interactions*

15.4.32 The potential spring feature north-east of Fox Covert, Heatley would be permanently lost and incorporated into the drainage system for the Proposed Scheme. Until the nature of this feature has been confirmed by a site survey, this feature is assumed to be a high value receptor. On a precautionary basis, the assessment therefore identifies its loss as potentially resulting in a permanent major adverse effect, which is significant.

15.4.33 Groundwater flow to the two potential spring features, located to the south and south-west of Church Farm, Glazebrook, could be disrupted by piled foundations for the Proposed Scheme. These would be permanent moderate adverse effects, which are significant.

### Water dependent habitats

15.4.34 No permanent impacts on water dependent habitats are anticipated in this study area as a result of construction of the Proposed Scheme. Any permanent impacts from construction on Holcroft Moss SSSI and Risley Moss SSSI (located in the adjacent Risley to Bamfurlong area (MA05)) are discussed in the Volume 2: Community area report MA05, Risley to Bamfurlong.

#### *Permanent effects - flood risk and land drainage*

15.4.35 Hydraulic modelling of Agden Lane Drain 1 towards the Bridgewater Canal is currently being undertaken to assess potential effects related to flood risk. It is currently anticipated on a precautionary basis that the Proposed Scheme would result in moderate impacts on flood levels. This would potentially affect residential properties, which are high value receptors, resulting in moderate adverse effects, which are significant.

15.4.36 Hydraulic analysis of River Bollin is also being undertaken. It is currently anticipated that the Proposed Scheme would result in negligible impacts on flood levels.

## Other mitigation measures

15.4.37 Additional mitigation measures to further reduce the temporary and permanent impacts of construction stage activities, where there is potential for the Proposed Scheme to result in significant effects are described in the sections below.

#### *Groundwater - surface water interactions*

15.4.38 A survey of the potential spring features south and south-west of Church Farm will be undertaken to determine their value and to identify whether further mitigation is possible. If they are confirmed to be springs of high to moderate value, measures would be implemented to reduce the adverse effects, as far as practicable.

15.4.39 Any such additional measures will be designed in consultation with the Environment Agency.

#### *Flood risk and land drainage*

15.4.40 Hydraulic modelling is currently being undertaken for the Proposed Scheme and its interaction with Agden Lane Drain 1. Any requirement for mitigation identified from the modelling will be developed in consultation with the LLFA.

## Summary of likely residual significant effects

15.4.41 In the absence of the other mitigation measures set out above, the Proposed Scheme would potentially result in residual significant effects as follows:

- a potential temporary moderate adverse effect on two springs south and south-west of Church Farm, Glazebrook Moss, which is significant;
- a permanent major adverse effect due to the loss of the spring north-east of Fox Covert, which is significant;

- permanent moderate adverse effects due to the disruption of groundwater flow to the springs south and south-west of Church Farm, which is significant; and
- a permanent moderate adverse effect on flood risk from Agden Lane Drain 1, which is significant.

15.4.42 It is currently anticipated that it should be possible to develop the means of mitigating these impacts, to ensure that there are no residual significant effects arising from construction of the Proposed Scheme, with the exception of:

- the disruption of groundwater flow to the springs south and south-west of Church Farm. It is likely that even with mitigation measures, the construction of the Proposed Scheme would disrupt groundwater flow to these features potentially resulting in a moderate adverse effect which is significant; and
- the loss of the spring north-east of Fox Covert resulting in a major adverse effect which is significant.

## 15.5 Effects arising from operation

### Avoidance and mitigation measures

15.5.1 The principal issue of concern during operation of the Proposed Scheme is the potential for accidental spillages to occur that could result in the release of contaminants into the water environment. This issue has been assessed on a route-wide basis in Volume 3: Route-wide effects (Section 16), where the mitigation measures associated with this risk are described. A draft operation and maintenance plan for water resources and flood risk will be provided in the formal ES.

15.5.2 The design takes into account the policies in the NPPF and will aim to ensure that the Proposed Scheme is safe from flooding without increasing flood risk elsewhere. Evidence of application of the Sequential Test and Exception Tests in the NPPF is provided on a route-wide basis in Volume 3: Route-wide effects.

15.5.3 Sustainable drainage systems will be used where reasonably practicable. These will help to remove any suspended material within runoff from the Proposed Scheme through filtration, vegetative adsorption or settlement. The drainage systems proposed will aim to ensure that the quantity and quality of water draining from the Proposed Scheme during its operational phase will have a negligible impact on the water environment.

15.5.4 A summary of the route-wide WFD compliance assessment process is provided in Volume 3: Route-wide effects. This describes the ongoing assessment process and how measures will be embedded into the design that are specifically designed to ensure that the Proposed Scheme complies with the requirements of the WFD, where reasonably practicable. It is currently anticipated that the Proposed Scheme will be compliant with WFD legislation.

## Assessment of impacts and effects

15.5.5 There are considered to be no significant adverse effects related to water resources and flood risk arising from operation of the Proposed Scheme.

## Other mitigation measures

15.5.6 There are considered to be no further measures required to mitigate adverse effects on surface water resources, groundwater resources or flood risk.

## Summary of likely residual significant effects

15.5.7 The assessment indicates that there would be no residual significant effects on surface water, groundwater or flood risk during operation of the Proposed Scheme.

## Monitoring

15.5.8 Volume 1, Section 9 sets out the general approach to monitoring of water resources and flood risk during operation of the Proposed Scheme.

15.5.9 There are no area-specific requirements for monitoring water resources and flood risk during operation of the Proposed Scheme.

# 16 References

Annex 1 of the EU's Habitats Directive (1992) lists key habitat types whose conservation requires the designation of Special Areas of Conservation

Annual Population Survey (2016), NOMIS. Available online at https://www.nomisweb.co.uk

Bats Local Biodiversity Action Plan – Cheshire Wildlife Trust https://www.cheshirewildlifetrust.org.uk/sites/default/files/2018-06/Bats.pdf

BE Group and Mickledore (2016). Economic Development Needs Study. Warrington Borough Council

BGS groundwater flooding

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

British Geological Survey radon potential dataset

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

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

BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations, 2012, British Standard

Cheshire and Warrington Enterprise Partnership (2014). Cheshire and Warrington Matters: A Strategic and Economic Plan for Cheshire and Warrington. [online] p.45. Available at: http://www.871candwep.co.uk/content/uploads/2015/05/Strategic-and-Economic-Plan-and-Growth-Plan-for-Cheshire-and-Warrington.pdf

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

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

Defra (2009), Soil Strategy for England

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

Department for Communities and Local Government (DCLG) (2014), Planning Practice Guidance – Noise. Available online at: https://www.gov.uk/guidance/noise--2

Department for Communities and Local Government (2015) English Indices of Deprivation 2015. Available online at: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015

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

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

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

EU Water Framework Directive http://ec.europa.eu/environment/water/water-framework/index_en.html

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

Great Crested Newt Species Action Plan Greater Manchester Biodiversity Project, 2009 http://www.gmbp.org.uk/site/images/stories/great%20crested%20newt%20bap_09.pdf

Greater Manchester Joint Minerals Plan. March 2017. Available online: https://www.trafford.gov.uk/planning/strategic-planning/local-plan/greater-manchester-joint-minerals-development-plan-document.aspx

Greater Manchester Joint Waste Development Plan Document 2012-2027 (Adopted 2012). Available online at: http://www.gmwastedpd.co.uk/doclib.html#Adopted_Waste_Plan_Documents

Greater Manchester Local Enterprise Partnership (2013). Stronger Together - Greater Manchester Strategy. GMCA

Greater Manchester Transport Strategy 2040 (Adopted 2017). Available online at: https://www.tfgm.com/2040

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

HS2 (2012). HRA Screening Report for Manchester Mosses SAC

HS2 (2016) Manchester Mosses Habitat Regulation Assessment (HRA) Screening Report-Addendum 2016

Long term flood risk information https://flood-warning-information.service.gov.uk/long-term-flood-risk/

Mersey Forest Plan. Available at: http://www.merseyforest.org.uk/about/plan/

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

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

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

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

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

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

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

North West Brown Hare Project Final Report – January 2013

Office for National Statistics (2016); Business Register and Employment Survey; http://www.nomisweb.co.uk

Office for National Statistics (2017) UK Business Count – Local Units. Available online at https://www.nomisweb.co.uk

Otter Local Biodiversity Action Plan – Cheshire Wildlife Trust https://www.cheshirewildlifetrust.org.uk/sites/default/files/2018-06/Otter.pdf

Ove Arup and Partners Ltd (2009), Trafford Employment Land Study: Final Report. Based on upper range

Polecat Local Biodiversity Action Plan – Cheshire Wildlife Trust https://www.cheshirewildlifetrust.org.uk/sites/default/files/2018-06/Polecat.pdf

Salford City Council, Landscape Character Assessment. Available online at: https://www.salford.gov.uk/planning-building-and-regeneration/salfords-natural-environment/landscape/landscape-character-assessment

Section 41 of the National Environment and Rural Communities Act 2007

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

Statutory Instrument 1997 No. 1160 Hedgerows Regulations 1997

Supporting document: Draft Code of Construction Practice

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

Trafford Local Plan: Core Strategy 2011-2026 (Adopted 2012). Available online at: http://www.trafford.gov.uk/planning/strategic-planning/local-plan/core-strategy.aspx

Trafford Metropolitan Borough Council (2013), Trafford Employment Land Study

Trafford Metropolitan Borough Landscape Strategy (2004). Available online at: http://www.trafford.gov.uk/planning/strategic-planning/docs/spg-2004-landscape-strategy.pdf

Trafford Unitary Development Plan 2002-2016 (saved policies) (Adopted 2006). Available online at: http://www.trafford.gov.uk/planning/strategic-planning/unitary-development-plan.aspx

UK Maps of Radon, Public Health England, www.ukradon.org/information/ukmaps

Urban Vision. Warrington Borough Council Minerals Resource Study and Policy Review. March 2017.Available online at: https://www.warrington.gov.uk/info/201368/local_plan_review/2347/local_plan_review_-_supporting_documents

Warrington Borough Council. Local Plan Core Strategy. July 2014. Available online at: https://www.warrington.gov.uk/info/200564/planning_policy/1903/local_plan

Warrington Landscape Character Assessment (2007). Available online at: https://www.warrington.gov.uk/downloads/file/8633/landscape_character_assessment_2007

Warrington Local Plan Core Strategy 2012-2027 (Adopted 2014). Available online at: https://www.warrington.gov.uk/info/200564/planning_policy/1903/local_plan

Warrington Local Transport Plan 3 2011-2030. Available online at: https://www.warrington.gov.uk/downloads/download/367/local_transport_plan_3

Water vole Local Biodiversity Action Plan – Cheshire Wildlife Trust https://www.cheshirewildlifetrust.org.uk/sites/default/files/2018-06/Water%20vole.pdf

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

HS2

www.hs2.org.uk

**High Speed Two (HS2) Limited**
Two Snowhill,
Snow Hill Queensway,
Birmingham B4 6GA
Freephone: 08081 434 434
Minicom: 08081 456 472
Email: HS2enquiries@hs2.org.uk