

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

Working Draft Environmental Statement

Volume 2: Community Area report

MA06: Hulseheath to Manchester Airport

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Department
for Transport

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

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Preface

The working draft Environmental Statement

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

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

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

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

Consultation on the working draft Environmental Statement

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

Structure of the HS2 Phase 2b working draft Environmental Statement

This report forms part of Volume 2 of the working draft ES for Phase 2b of HS2. The working draft ES describes the design of the Proposed Scheme and reports the likely significant environmental effects of the construction and operation of the Proposed Scheme and proposed mitigation and monitoring measures, based on a stage in the ongoing design and environmental assessment process. The report will be updated for the formal ES to reflect further work on the design, assessment and mitigation and monitoring measures between now and when the hybrid Bill is deposited. The structure of the working draft ES is shown 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: MAo1 Hough to Walley's Green; MAo2 Wimboldsley to Lostock Gralam; MAo3 Pickmere to Agden and Hulseheath; MAo4 Broomedge to Glazebrook; MAo5 Risley to Bamfurlong; MAo6 Hulseheath to Manchester Airport; MAo7 Davenport Green to Ardwick; MAo8 Manchester Piccadilly Station; and
- eastern leg: LAo1 Lea Marston to Tamworth; LAo2 Birchmoor to Austrey; LAo3 Appleby Parva to Ashby-de-la-Zouch; LAo4 Coleorton to Kegworth; LAo5 Ratcliffe-on-Soar to Long Eaton; LAo6 Stapleford to Nuthall; LAo7 Hucknall to Selston; LAo8 Pinxton to Newton and Huthwaite; LAo9 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.

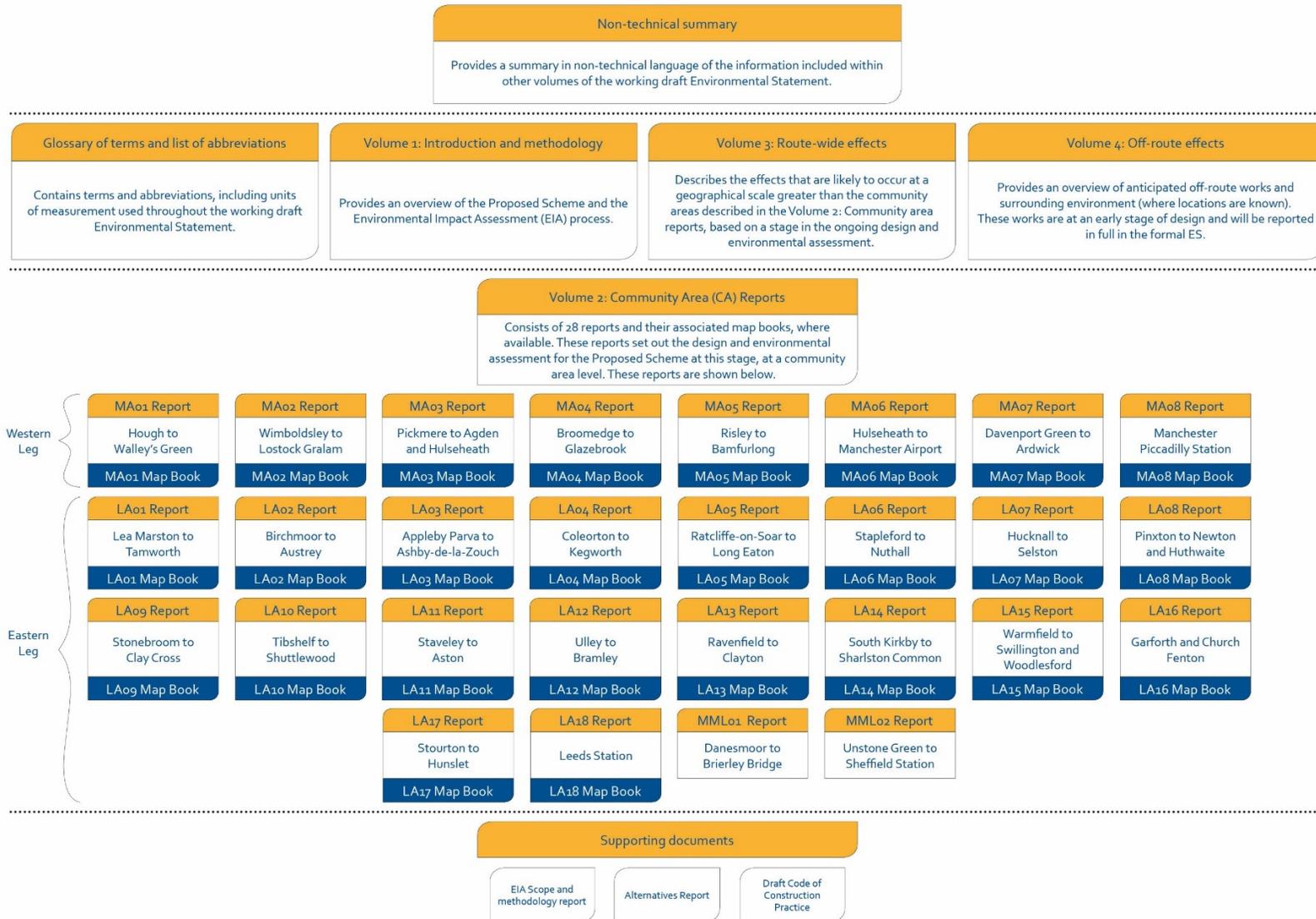
Volume 4: Off-route effects

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

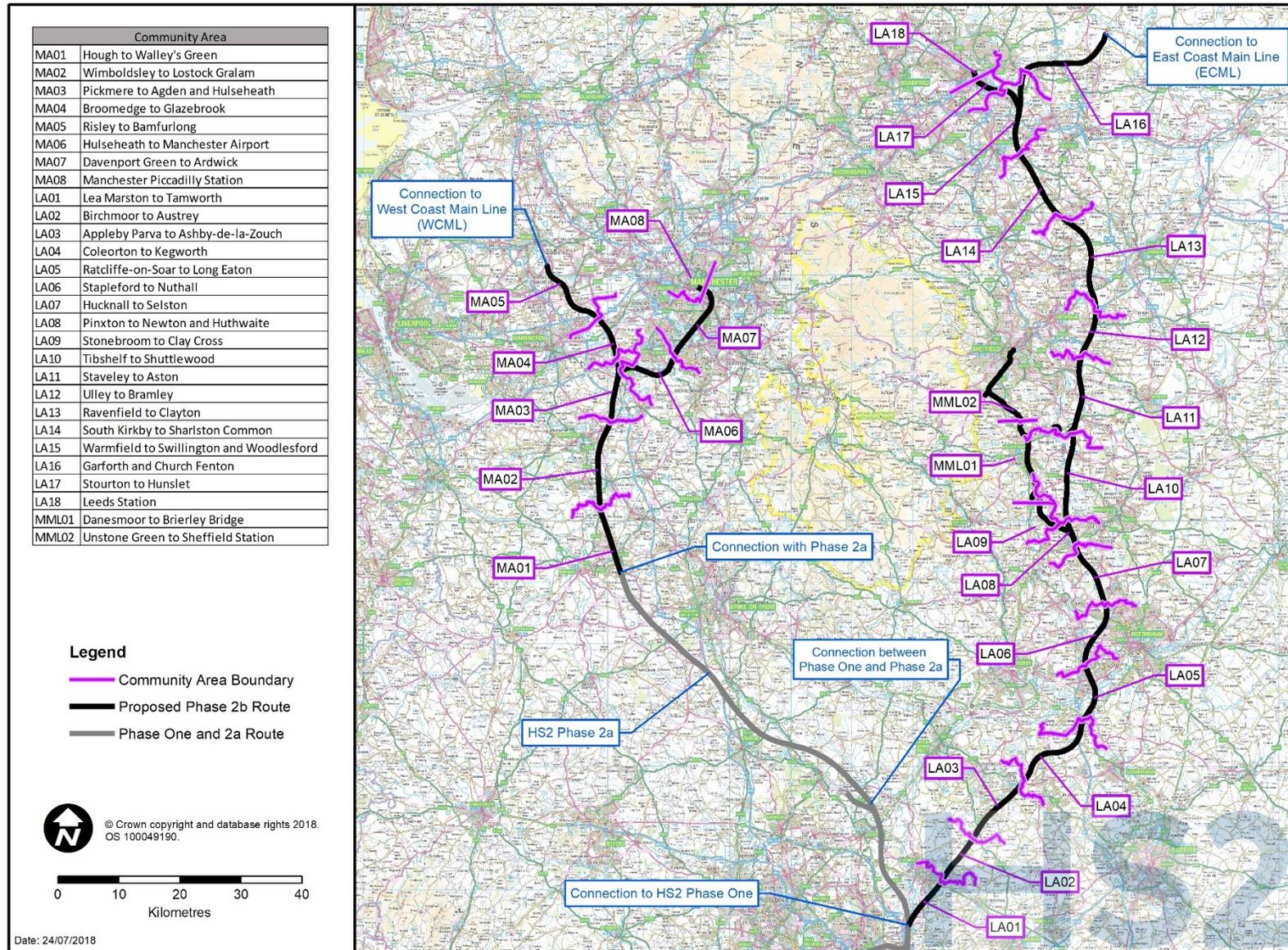


1 Introduction

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 225 miles per hour (mph) (360 kilometres per hour (kph)).
- 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 Hulseheath to Manchester Airport area (CA number MAo6) 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 Hulseheath to Manchester Airport area. The report also describes the proposed mitigation measures that have been identified, at this stage, to avoid, reduce or manage the likely significant adverse effects of the Proposed Scheme on the environment within the area, along with proposed monitoring measures.
- 1.2.2 The design development and environmental assessment process is ongoing. Consultation on the working draft ES is being carried out to assist early engagement with those potentially affected by the Proposed Scheme and to help inform the design and assessment of the Proposed Scheme. Parliamentary Standing Orders do not require a working draft ES. Developing a working draft ES and consulting on it in advance of the formal ES means that consultees have the opportunity to comment on the Proposed Scheme earlier in the process.
- 1.2.3 As this is a working draft ES, where information is not available at this time, professional judgement and reasonable worst-case assumptions have been used to provide an indication of the likely impact to inform the consultation.
- 1.2.4 The likely significant environmental effects of the Proposed Scheme will be described in the formal ES to be deposited in accordance with the requirements of Parliamentary Standing Order 27A (SO27A)^{1,2}. It is possible that the effects and mitigation described in the formal ES may differ from those presented in this working draft ES, due to the provisional nature of the environmental and design information that is currently available and as a result of consultation on the Proposed Scheme, as appropriate.
- 1.2.5 The working draft ES has been undertaken on the assumption that the policies adopted for Phase One and Phase 2a will also apply to Phase 2b. The assessment also assumes that any general mitigation measures required as a result of those policies are implemented appropriately in the delivery and operation of the Proposed Scheme. Where policies are referred to in this working draft ES it is on this basis.

1.3 Structure of this report

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

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

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

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

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

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

1.3.4 The maps relevant to the Hulseheath to Manchester Airport area are provided in a separate corresponding document entitled Volume 2: MAo6 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: MAo6 Map Book). There is some flexibility during detailed design to alter the horizontal and vertical alignments and

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

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other details within the limits shown on the plans and sections submitted to Parliament and as set out in the Bill, and this flexibility is included within the scope of the environmental assessment. Further explanation is provided in Volume 1, Section 1.

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

2 Overview of the area and description of the Proposed Scheme

2.1 Overview of the area

General

2.1.1 The Hulseheath to Manchester Airport area covers an approximately 12km long section of the Proposed Scheme passing through the parishes of Rostherne, Ashley, and Ringway, within the local authority areas of Cheshire East Council (CEC), Trafford Metropolitan Borough Council (TMBC) and Manchester City Council (MCC). The boundary between Tatton, Rostherne and Millington parishes and Little Bollington, Agden, High Legh, Mere and Knutsford parishes forms the southern boundary of this section. The northern boundary of Ringway and Styal parishes forms the northern boundary of this section.

2.1.2 As shown in Figure 3, the Pickmere to Agden and Hulseheath area (MA03) lies to the south and the Davenport Green to Ardwick (MA07) area lies to the north.

Settlement, land use and topography

2.1.3 The Hulseheath to Manchester Airport area is semi-rural in character with agricultural and recreational land use. Urban land use dominates the north-west part of the area, notably the towns of Altrincham and Hale.

2.1.4 There are a number of settlements within the Hulseheath to Manchester Airport area. At the southern end of the area is Rostherne, the village of Ashley is in the centre and Warburton Green is at the north-eastern edge of the area.

2.1.5 Notable land uses within the area are Rostherne Mere, a National Nature Reserve of 48ha, and Manchester Airport which consists of three terminals, two runways and other related functions covering some 560ha.

2.1.6 The topography of the land in the Hulseheath to Manchester Airport area is predominantly flat, ranging from 25m to 77 AOD.

Key transport infrastructure

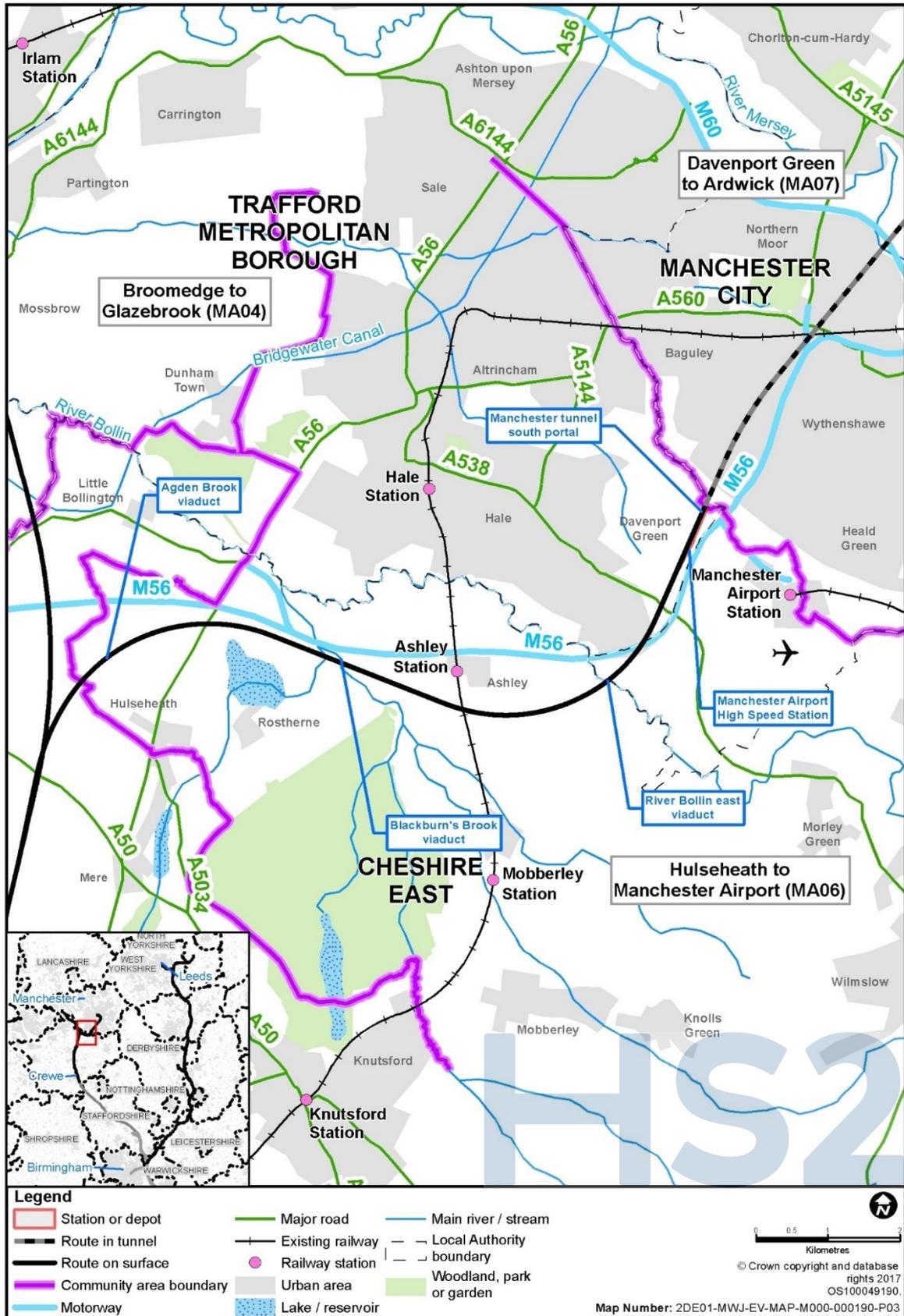
2.1.7 The M56 passes through the area from junctions 8 to 6, with junction 5 near the northern boundary.

2.1.8 There are a number of important highways in the area predominantly running through the towns of Altrincham and Hale. These include the A56 Manchester Road, the A560 Stockport Road, the A538 Hale Road/Wilmslow Road, the A5144 Delaways Road and the A556 Chester Road.

2.1.9 The Mid-Cheshire Line and Crewe to Manchester Line are two existing railways that run through the area. The Crewe to Manchester (via Styal) Line is present only for a short section in the far north-east corner of the area.

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Figure 3: Community area context map



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- 2.1.10 The Bridgewater Canal is present in the area, entering the area just north of Dunham Park and running through Altrincham to the area's northern boundary.
- 2.1.11 Manchester Airport is the only airport in the United Kingdom, other than Heathrow, to have two full-length runways capable of handling all aircraft types. In the calendar year 2017, the airport had a passenger throughput of 27.9 million. The airport has its own ground transport interchange, called The Station. Situated between passenger Terminals 1 and 2, this interchange connects bus, coach, rail and light rail services, which operate to and from the airport, together under one roof.
- 2.1.12 The Cheshire Way and Cheshire Ring Canal Walk National Trails are both located in the area. Routes 70, 82 and 85 of the National Cycle Network run through the area.

Socio-economic profile

- 2.1.13 Within the CEC area there is a wide spread of business types, which reflects a diverse range of commercial activities. The retail sector accounts for the largest proportion of businesses (14%); the professional, scientific and technical sector is the second largest (13%), followed by human health and social work (12%), and then manufacturing (11%).
- 2.1.14 According to the Annual Population Survey (2016⁴), the employment rate within the CEC area was 76% (176,800 people) and unemployment in the CEC area was 3% (6,200 people).
- 2.1.15 The survey also shows that 39% of CEC residents aged 16-64 were qualified to National Vocational Qualification Level 4 (NVQ4) and above, while 6% of residents had no qualifications.
- 2.1.16 Within the TMBC area, retail accounts for the largest proportion of businesses, at 18%. Administrative and support service jobs and professional, scientific and technical jobs provide the second and third largest proportions of employment at 16% and 14% respectively.
- 2.1.17 According to the Annual Population Survey (2017⁵), the employment rate within the TMBC area was 78% (119,300 people) and unemployment in the TMBC area was 4% (4,300 people).
- 2.1.18 The survey also shows that 52% of TMBC residents aged 16-64 were qualified to NVQ4 and above, while 5% of residents had no qualifications.
- 2.1.19 Within the MCC area, there are five sectors that dominate employment: professional, scientific and technical at 13%, retail at 12%, human health and social work at 12%, administrative and support services at 12% and education at 10%.
- 2.1.20 According to the Annual Population Survey (2017), the employment rate within the MCC area was 65% (250,400 people) and unemployment in the MCC area was 7% (17,600 people).

⁴ Annual Population Survey (2016), *NOMIS*. Available online at <https://www.nomisweb.co.uk>

⁵ Office for National Statistics; (2017); UK Business Count – Local Units; <http://www.nomisweb.co.uk>

- 2.1.21 The survey also shows that 39% of MCC residents aged 16-64 were qualified to NVQ4 and above, while 11% of residents had no qualifications.

Notable community facilities

- 2.1.22 The main concentrations of community facilities are centred on the larger urban settlement of Hale Barns to the north. The villages of Rostherne, Ashley and Warburton Green provide a smaller number of local services.
- 2.1.23 Hale Barns is a predominantly residential village located in the east of the area. The village has approximately 1,500 residential properties. Hale Barns has several notable community facilities, which are clustered around the A538 Hale Road. These include of nursery schools, two primary schools, a high school, places of worship and Cliffemount Community Care home.
- 2.1.24 The rural settlement of Rostherne is sparsely populated, with approximately 115 residential properties. There are a small number of community facilities within the area; including the Children's Adventure Farm Trust at Booth Bank Farm and Bucklow Manor Nursing Home.
- 2.1.25 The village of Ashley has approximately 70 residential properties. The village is south of the M56. Notable community facilities in Ashley include Sunnyside Pre-school Nursery, places of worship, Ashley train station providing hourly services to Manchester and Chester. Higher Thorns Green Farm operates in conjunction with the Fairfield Care Services' Farm Project.
- 2.1.26 The Warburton Green settlement is predominantly residential, with approximately 1,500 residential properties in total. Notable community facilities in the area include educational facilities and places of worship. There is also a health centre, care homes and recreational facilities such as Hale Golf Club, Ringway Golf Club, the Tennis Club and Hale Barns Cricket Club.
- 2.1.27 Other notable community facilities in the area include the Children's Adventure Farm Trust, which is located in Booth Bank.

Recreation, leisure and open space

- 2.1.28 The Hulseheath to Manchester Airport area is predominantly rural to the south of the route of the M56, and urban to the north. Notable recreation, leisure and open space facilities include: Tatton Park, which is a large National Trust property with landscaped gardens, an extensive deer park and a rare breed farm; the National Trust's Quarry Bank Milland Sunbank Wood. Among other facilities in the area are: Ashley Cricket Club; Hale Golf Club (south of Hale); Hale Barns Cricket Club; and Ringway Golf Club (north of Hale Barns).
- 2.1.29 There are also several sports fields, clubs and recreational grounds within villages in the area, which offer leisure opportunities to residents.

Policy and planning context

Planning framework

- 2.1.30 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.
- 2.1.31 The following local policy documents have been considered and referred to where appropriate to the assessment:
- Adopted Cheshire East Local Plan Strategy 2010-2030 (2017)⁶;
 - Adopted Manchester City Council Core Strategy 2012-2027 (2012)⁷;
 - Adopted Trafford Local Plan: Core Strategy 2011-2026 (2012)⁸;
 - Adopted Macclesfield Borough Local Plan 2004-2011 (saved policies) (2004)⁹;
 - Adopted Manchester Unitary Development Plan (saved policies) (1995)¹⁰;
 - Adopted Trafford Unitary Development Plan (saved policies) (2006)¹¹;
 - Adopted Cheshire Replacement Waste Local Plan 2007 (saved policies) (2007)¹²;
 - Adopted Greater Manchester Joint Waste Development Plan Document (2012)¹³;
 - Adopted Cheshire Replacement Minerals Local Plan 1999 (saved policies) (1999)¹⁴;
 - Adopted Greater Manchester Joint Minerals Development Plan Document (2013)¹⁵;

⁶ Cheshire East Local Plan Strategy 2010-2030 (Adopted 2017). Available online at:

http://www.cheshireeast.gov.uk/planning/spatial_planning/cheshire_east_local_plan/local-plan-strategy/local_plan_strategy.aspx

⁷ Manchester City Council Core Strategy 2012-2027 (Adopted 2012). Available online at:

http://www.manchester.gov.uk/info/200074/planning/6573/core_strategy_2012-2027

⁸ Trafford Local Plan: Core Strategy 2011-2026 (Adopted 2012). Available at: <http://www.trafford.gov.uk/planning/strategic-planning/local-plan/core-strategy.aspx>

⁹ Macclesfield Borough Local Plan 2004 – 2011 (saved policies) (Adopted 2004). Available online at:

http://www.cheshireeast.gov.uk/planning/spatial_planning/saved_and_other_policies/macclesfield_local_plan/macclesfield_local_plan.aspx

¹⁰ Manchester City Council Unitary Development Plan Policies (saved policies) (Adopted 1995). Available online at:

http://www.manchester.gov.uk/downloads/download/4975/extant_udp_policies

¹¹ Trafford Unitary Development Plan (saved policies) (Adopted 2006). Available online at: <http://www.trafford.gov.uk/planning/strategic-planning/unitary-development-plan.aspx>

¹² Cheshire Replacement Waste Local Plan 2007 (Adopted 2007). Available online at:

http://www.cheshireeast.gov.uk/planning/spatial_planning/saved_and_other_policies/cheshire_waste_local_plan/cheshire_waste_local_plan.aspx

¹³ Greater Manchester Joint Waste Development Plan Document (Adopted 2012). Available online at: <http://www.gmwastedpd.co.uk/>

¹⁴ Cheshire Replacement Minerals Local Plan 1999 (Adopted 1999). Available online at:

http://www.cheshireeast.gov.uk/planning/spatial_planning/saved_and_other_policies/cheshire_minerals_local_plan/cheshire_minerals_local_plan.aspx

¹⁵ Greater Manchester Joint Minerals Development Plan Document (Adopted 2013). Available online at: <http://www.gmmineralsplan.co.uk/>

- Adopted Cheshire East Local Transport Plan Strategy 2011-2026 (2011)¹⁶; and
- Greater Manchester Transport Strategy 2040 (2017)¹⁷.

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

Committed development

2.1.33 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.

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

2.1.35 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.

2.1.36 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

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

- location of a proposed temporary railhead and associated compound;
- ongoing design of the Manchester Airport High Speed station, including the potential to provide up to four platforms;
- temporary and permanent utility diversions;
- refinement of construction compound locations and site haul routes;
- review of the proposed lengths and heights of viaducts and other river crossing structures;
- refinement of auto-transformer stations;

¹⁶ Cheshire East Local Transport Plan Strategy 2011-2026 (Adopted 2011). Available online at: http://www.cheshireeast.gov.uk/public_transport/local_transport_plan/local_transport_plan.aspx

¹⁷ Greater Manchester Transport Strategy 2040 (Adopted 2017). Available online at: <https://www.tfgm.com/2040>

- refinement of highway and existing railway crossings;
- refinement of drainage features required for rail and highways;
- refinement of maintenance access routes and access to balancing ponds;
- refinement of the realignment, diversion or closure of roads and PRoW crossing the route of the Proposed Scheme;
- additional environmental features required to mitigate likely significant environmental effects; and
- accommodation works and crossings of the route for private means of access.

2.2 Description of the Proposed Scheme

2.2.1 The following section describes the main features of the Proposed Scheme in the Hulseheath to Manchester Airport 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 Hulseheath to Manchester Airport area would be 12km long and within the CEC, TMBC and MCC areas. The route would extend from Millington Clough in the south and travel north towards Warburton Green, ending at Manchester Tunnel South porous portal.

2.2.5 This section of route is illustrated on maps CT-06-351 to CT-06-357a in the Volume 2: MAo6 Map Book.

2.2.6 All dimensions in the sections below are approximate.

2.2.7 The Proposed Scheme through the Hulseheath to Manchester Airport area has three main components:

- the HS2 main line for a total length of 10.5km;
- Manchester Airport High Speed station for a total length of 1.6km (located within a cutting); and
- tunnel portal for a total length of 50m (Manchester tunnel south portal).

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

2.2.9 In general, features are described along the route of the Proposed Scheme from south to north and from west to east as they would cross the Proposed Scheme, as shown on Map Series CT-06 in the Volume 2: MA06 Map Book.

2.2.10 Each of these components and their key features are set out in the following sections. Some of the mitigation described in this section has been provided on a precautionary basis, and will be subject to refinement following further survey, design development and environmental assessment. Where key features are associated with more than one component of the Proposed Scheme, they are described within the section they are first associated with. Where reference is made to the Proposed Scheme, this includes the two components collectively.

Millington Clough underbridge to Blackburn's Brook embankment

2.2.11 The Proposed Scheme would continue from the Pickmere to Agden and Hulseheath area (MA03) east towards Blackburn's Brook embankment. The route of the Proposed Scheme would continue within MA06 on Millington Clough underbridge before passing over the Agden Brook viaduct. The route would then continue into Rostherne cutting before rising onto the Blackburn's Brook embankment.

2.2.12 This section of route is illustrated on maps CT-06-351 to CT-06-353 in the Volume 2: MA06 Map Book.

2.2.13 Key features of this 3.3km section would include:

- Millington Clough underbridge, 50m in length, height and clearance dimensions will follow in the formal ES, to allow Millington Clough to pass under the Chapel Lane House accommodation access (see Volume 2: Map CT-06-351, D9);
- Millington embankment, 148m in length, 79m in width and up to 13m in height, with associated landscape earthworks and landscape mitigation planting on both sides to help integrate the Proposed Scheme into the surrounding landscape and reduce noise (see Volume 2: Map CT-06-351, C8 to E6);
- Chapel Lane House accommodation access 610m in length (see Volume 2: Map CT-06-351, D8 to D10);
- a balancing pond for railway drainage within an area of woodland habitat creation to the east of the route of the Proposed Scheme, 430m south of Millington Clough. Access would be provided via a new access track from Chapel Lane House accommodation access off Chapel Lane (see Volume 2: Map CT-06-351, C8 to C9);
- Millington Clough culvert, along Chapel Lane House accommodation access, for surface water drainage under the realigned road (see Volume 2: Map CT-06-351, D9);
- a balancing pond for railway drainage to the north of the route of the Proposed Scheme, 100m south of Agden Brook. Access would be provided via a new access track from Boothbank Lane (see Volume 2: Map CT-06-351, E6);

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- diversion of Millington Footpath 3/1 40m north of its current alignment for 700m, crossing the route of the Proposed Scheme under Agden Brook viaduct (see Volume 2: Map CT-06-351, E6 to E7);
- closure of Millington Footpath 3/3 where it would cross the route of the Proposed Scheme. Users would be diverted along the diverted Millington Footpath 3/1, increasing the length of the journey by 120m (see Volume 2: Map CT-06-351, E8);
- closure of Millington Footpath 4/1 where it would cross the route of the Proposed Scheme. Users would be diverted along the diverted Millington Footpath 3/1, increasing the length of the journey by 40m (see Volume 2: CT-06-351, E6);
- closure of Millington Footpath 5/2 where it would cross the route of the Proposed Scheme. Users would be diverted along the diverted Millington Footpath 3/1, increasing the length of the journey by 100m (see Volume 2: CT-06-351, E6 to E7);
- Agden Brook viaduct, 59m in length and up to 15m in height (above ground level), with wetland habitat creation under the viaduct on both sides of the Proposed Scheme (see Volume 2: Map CT-06-351, E6 to F6);
- Rostherne cutting, 2.9km in length, up to 21m in depth and 149m in width, with associated landscape earthworks to help integrate the Proposed Scheme into the surrounding landscape (and incorporating an area of woodland habitat creation). This mitigation would be located to the north and south of the Proposed Scheme (see Volume 2: Map CT-06-351, F6 to J4, Map CT-06-352, A5 to J6 and Map CT-06-353, A3 to G3);
- a balancing pond for railway drainage to the north of the route of the Proposed Scheme, adjacent to the Millington Lane realignment. Access would be provided via Millington Lane (see Volume 2: Map CT-06-351, E2 to E3);
- realignment of Millington Lane, 50m to the east of its existing alignment on an embankment, with landscape mitigation planting. This mitigation would be located to the south of the realignment. The realigned Millington Lane would cross the route of the Proposed Scheme on Millington Lane overbridge, 55m long and up to 4m above existing ground level. The existing Millington Lane would be closed where it would cross the route of the Proposed Scheme (see Volume 2: Map CT-06-351, E2 to G7 and Map CT-06-352, A3 to B7);
- a balancing pond for railway drainage south of the route of the Proposed Scheme, adjacent to the Millington Lane realignment. Access would be provided via Millington Lane (see Volume 2: Map CT-06-351, G7 and Map CT-06-352, B7);
- closure of Millington Footpath 8/1 where it would cross the route of the Proposed Scheme (see Volume 2: Map CT-06-351, J4 to J5 and Map CT-06-352, E4 to E5);

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- closure of Millington Footpath 7/4 where it would cross the route of the Proposed Scheme (see Volume 2: Map CT-06-352, E4 to F5);
- realignment of Millington Footpath 7/2 100m east of its current alignment for 1.4km, crossing the route of the Proposed Scheme on the Millington Footpath 7/2 accommodation overbridge (see Volume 2: Map CT-06-352, E3 to F5);
- Millington Footpath 7/2 accommodation overbridge, 53m in length and up to 4m above existing ground level (see Volume 2: Map CT-06-352, F4);
- A556 Chester Road overbridge, 60m in length, and up to 0.5m above existing ground level (see Volume 2: Map CT-06-352, G4 to G5);
- closure of Rostherne Footpath 13/1 where it would cross the route of the Proposed Scheme (see Volume 2: Map CT-06-353, A1 to A2);
- closure of Tom Lane where it would cross the route of the Proposed Scheme (see Volume 2: Map CT-06-353, B3);
- closure of Rostherne Footpath 4/1 where it would cross the route of the Proposed Scheme (see Volume 2: Map CT-06-353, C3 to C5);
- closure of Bowden View Farm access where it would cross the route of the Proposed Scheme (see Volume 2: Map CT-06-353, C3);
- Tom Lane auto-transformer station, on the northern side of the route of the Proposed Scheme within an area of landscape mitigation planting, 200m east of Tom Lane. Access would be provided via Yarwoodheath Road (see Volume 2: Map CT-06-353, D3);
- a balancing pond for railway drainage within an area of woodland habitat creation south of the route of the Proposed Scheme, 100m west of Blackburn's Brook. Access would be provided via a new access track from Cherry Tree Lane (see Volume 2: Map CT-06-353, F3 to F4); and
- Blackburn's Brook embankment, 137m in length, 24m in width and up to 3m in height, with associated landscape mitigation planting to help integrate the Proposed Scheme into the surrounding landscape). This mitigation would be located south of the Proposed Scheme (see Volume 2: Map CT-06-353, F3 to G3).

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

2.2.15 Construction of this section would be managed from the following compounds:

- Chapel Lane satellite compound;
- Agden Brook viaduct satellite compound;
- Millington Lane satellite compound;

- A556 Chester Road satellite compound and transfer node; and
- Blackburn's Brook satellite compound.

2.2.16 These are described in Section 2.3, and shown on maps CT-05-351 to CT-05-353 in the Volume 2: MAo6 Map Book.

Blackburn's Brook viaduct to River Bollin South embankment

2.2.17 The route would continue from Blackburn's Brook embankment onto Blackburn's Brook viaduct before rising on to Rostherne embankment. It would then continue on Ashley embankment, into Thorns Green cutting, before rising onto River Bollin South embankment.

2.2.18 This section of route is illustrated on maps CT-06-353 to CT-06-355 in the Volume 2: MAo6 Map Book.

2.2.19 Key features of this 4.4km section would include:

- Blackburn's Brook viaduct, 402m in length and up to 11m in height, with associated woodland habitat creation and an area of wetland habitat creation on both sides of the Proposed Scheme, under the viaduct (see Volume 2: Map CT-06-353, G3 to I3);
- Rostherne embankment, 911m in length, 50m in width and up to 8m in height, with associated landscape earthworks to help integrate the Proposed Scheme into the surrounding landscape (and incorporating areas of landscape mitigation). This mitigation would be located to the north and south of the Proposed Scheme (see Volume 2: Map CT-06-353, I3 to J3 and Map CT-06-354, A5 to D5);
- a balancing pond for railway drainage within an area of woodland habitat creation to the north of the route of the Proposed Scheme, 80m west of Birkin Brook. Access would be provided via a new access track from Lamb Lane (see Volume 2: Map CT-06-353, I3);
- realignment of Ashley Footpath 3/1 80m north of its existing alignment for 1.7km, crossing the route of the Proposed Scheme on the Ashley 6/5 accommodation overbridge (see Volume 2: Map CT-06-354, B5 to C5);
- a balancing pond for railway drainage within an area of landscape mitigation planting south of the route of the Proposed Scheme, 170m north-west of the junction with Lamb Lane and Ashley Road. Access would be provided via a new access track from Lamb Lane (see Volume 2: Map CT-06-354, D6);
- closure of Ashley Road 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 along (realigned) Mobberley Road and Lamb Lane, increasing the length of the journey by 2.6km (see Volume 2: Map CT-06-354, D5);
- realignment of Lamb Lane, 230m south-east of its existing alignment on an embankment 650m long (see Volume 2: Map CT-06-354, D5 to I6);

- Ashley embankment, 170m in length, 32m in width and up to 4m in height, with associated landscape earthworks to the north and landscape mitigation planting on both sides to help integrate the Proposed Scheme into the surrounding landscape (and incorporating an area of woodland habitat creation to the south). (see Volume 2: Map CT-06-354, E4 to J4 and Map CT-06-355, A5 to G7);
- realignment of Ashley Footpath 6/4, crossing the route of the Proposed Scheme on the Ashley 6/5 accommodation overbridge (see Volume 2: Map CT-06-354, F5 to F6);
- realignment of Ashley Footpath 6/5, crossing the route of the Proposed Scheme on the Ashley 6/5 accommodation overbridge (see Volume 2: Map CT-06-354, F5 to F6);
- Ashley Footpath 6/5 accommodation overbridge, 62m in length, and up to 11m above existing ground level (see Volume 2: Map CT-06-354, F5 to F6);
- three ecological mitigation ponds south of the route of the Proposed Scheme 300m to the east of Arden Lodge North, within an area of grassland habitat creation, to provide replacement habitat (see Volume 2: Map CT-06-354, G5, G6, H5, H6);
- a balancing pond for railway drainage south of the route of the Proposed Scheme, 320m to the east of Arden Lodge North. Access would be provided via a new access track from the realigned Lamb Lane (see Volume 2: Map CT-06-354, G6 to H6);
- an area of woodland habitat creation to the north of Arden House Wood, to provide replacement habitat (see Volume 2: Map CT-06-354, G7 to H8);
- realignment of Ashley Footpath 8/1 30m south of its existing alignment, joining the realigned Lamb Lane (see Volume 2: Map CT-06-354, I6 to I7);
- realignment of Mobberley Road, up to 150m to the east of its existing alignment on an embankment 850m long, with woodland habitat creation and landscape mitigation planting to the north and south. The realigned Mobberley Road would cross the route of the Proposed Scheme on Mobberley Road underbridge, 28m in length and up to 9m below existing ground level, with a limited height clearance. The existing Mobberley Road would be closed where it would cross the route of the Proposed Scheme (see Volume 2: Map CT-06-354, I4 to I9 and Map CT-06-355, A3 to A6);
- Hough Green culvert, 40m east of the Mid-Cheshire Line, for surface water drainage under the route of the Proposed Scheme (see Volume 2: Map CT-06-354, I5);
- a balancing pond for railway drainage south of the route of the Proposed Scheme, 295m to the north of Arden Lodge. Access would be provided via a new access track from the realigned Mobberley Road (see Volume 2: Map CT-06-354, I8);

- an area of grassland habitat creation south of the Proposed Scheme, adjacent to Birkin Brook (near Arden House) to provide replacement habitat (see Volume 2: Map CT-06-354, J4 and Map CT-06-355, A4 to B5);
- Birkinheath Covert underbridge (where the Proposed Scheme would pass over the Mid-Cheshire Line), 50m in length, up to 9m above ground level, with a clearance of 5m (see Volume 2: Map CT-06-354, I4);
- a balancing pond for railway drainage, south of the route of the Proposed Scheme, 158m to the west of Ecclesfield Wood. Access would be provided via a new access track from the realigned Mobberley Road (see Volume 2: Map CT-06-355, B6);
- diversion of Back Lane, up to 70m to the east of its existing alignment on Back Lane accommodation overbridge, 50m long and up to 12m above existing ground level. The existing Back Lane would be closed where it would cross the route of the Proposed Scheme (see Volume 2: Map CT-06-355, D5 to D9);
- an area of woodland habitat mitigation creation south of the Proposed Scheme, to the east of the diverted Back Lane (see Volume 2: Map CT-06-355, D7 to D9);
- two ecological mitigation ponds south of the Proposed Scheme, 300m south of Back Lane Farm, within an area of grassland habitat creation, to provide replacement habitat (see Volume 2: Map CT-06-355, E7 to E8);
- Thorns Green cutting, 802m in length, 73m in width and up to 11m in depth, with associated earthworks and mitigation planting to help integrate the Proposed Scheme into the surrounding landscape (and incorporating an area of woodland habitat creation). This mitigation would be located to the north and south of the Proposed Scheme (see Volume 2: Map CT-06-355, G7 to J6);
- realignment of Brickhill Lane up to 430m north-east of its existing alignment for 480m, to meet the realigned Castle Mill Lane south of the Castle Mill Lane overbridge (see Volume 2: Map CT-06-355, G8 to I7);
- realignment of Castle Mill Lane, up to 40m north-east of its existing alignment for 130m, crossing the Proposed Scheme on the Castle Mill Lane overbridge, 48m in length, and up to 3m above existing ground level (see Volume 2: Map CT-06-355, G5 to I8);
- a balancing pond for highway drainage, located 17m north of the existing Castle Mill Lane, near Thorns Green (see Volume 2: Map CT-06-355, H5);
- River Bollin South embankment, 106m in length, 50m in width and up to 8m in height (see Volume 2: Map CT-06-355, J5 to J6); and
- a balancing pond for railway drainage, south of the route of the Proposed Scheme, 270m north of hunters Close. Access would be provided via a new access track from the realigned Castle Mill Lane (see Volume 2: Map CT-06-355, J6).

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- 2.2.20 There would be maintenance access routes and hedgerow planting throughout this section. There would also be utilities works within this section, which may include works to low voltage overhead or underground lines, gas pipes, sewers and telecommunication cables.
- 2.2.21 Construction of this section would be managed from the following compounds:
- Blackburn's Brook satellite compound;
 - Birkin Brook viaduct satellite compound;
 - Birkinheath Covert satellite compound;
 - Mobberley Rail North satellite compound;
 - Mobberley Road South satellite compound; and
 - Castle Mill Lane satellite compound.
- 2.2.22 These are described in Section 2.3, and shown on map CT-05-353 to map CT-05-355 in the Volume 2: MAo6 Map Book.

River Bollin East viaduct to Manchester Airport High Speed station and Manchester tunnel south portal

- 2.2.23 The route would continue on the River Bollin East viaduct before passing onto the River Bollin North embankment. The route would continue into Halebank cutting, then pass under the M56 in the M56 East box structure and Manchester Airport Station cutting, before passing through the Manchester Airport High Speed station and Manchester tunnel south portal and then continuing into the Davenport Green to Ardwick area (MAo7) via the Manchester tunnel.
- 2.2.24 This section of route is illustrated on maps CT-05-356 to CT-06-357a in the Volume 2: MAo6 Map Book.
- 2.2.25 Key features of this 2.9km section would include:
- River Bollin East viaduct, 92m in length and up to 17m in height, to carry the Proposed Scheme over the River Bollin and its floodplain with an associated area of wetland habitat creation to west of the Proposed Scheme, adjacent to the River Bollin (see Volume 2: Map CT-06-356, A6 to B6);
 - a balancing pond for railway drainage, west of the Proposed Scheme, 60m north of the River Bollin, with access from the north via a new access track off Chapel Lane (see Volume 2: Map CT-06-356, B5);
 - River Bollin North embankment, 80m in length, 34m in width and up to 4m in height (see Volume 2: Map CT-06-356, B6);
 - Sunbank Lane auto-transformer station, 200m by 135m, 125m north of the River Bollin, with access via a new access track off Chapel Lane. There will be areas of woodland habitat creation to the north, east and the south of the auto-transformer station, including on the east and west sides of the Proposed Scheme (see Volume 2: Map CT-06-356, B6 to C6);

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- Halebank cutting, 467m in length, 100m in width and up to 15m in depth, with associated landscape earthworks on the east side and landscape mitigation planting on both sides of the Proposed Scheme to help integrate the Proposed Scheme into the surrounding landscape and reduce noise (see Volume 2: Map CT-06-356, B6 to D7);
- closure of Sunbank 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 along Sunbank Lane overbridge, increasing the length of the journey by 4.1km (see Volume 2: Map CT-06-356, C6);
- realignment of Ringway Footpath 12, 45m north of its current alignment for 75m, crossing the route of the Proposed Scheme on the Sunbank Lane overbridge (see Volume 2: Map CT-06-356, C6);
- Sunbank Lane overbridge, 60m in length and up to 2m above ground level (see Volume 2: Map CT-06-356, C6 to C7);
- closure of Ringway Footpath 11 where it would cross the route of the Proposed Scheme. Users would be diverted along Sunbank Lane overbridge, increasing the length of the journey by 360m (see Volume 2: Map CT-06-356, C7 to E7);
- M56 East box structure, 139m in length and up to 17m in depth (see Volume 2: Map CT-06-356, D7 to E7), to carry the Proposed Scheme beneath the M56);
- Manchester Airport High Speed Station cutting, 2km in length, up to 17m in depth and up to 50m in width, incorporating areas of landscape mitigation planting on both sides of the Proposed Scheme (see Volume 2: Map CT-06-356, E7 to J6, and Map CT-06-357a, A5 to F6);
- closure of Ringway Footpath 9 where it would cross the route of the Proposed Scheme. A section on the eastern side of the route of the Proposed Scheme would be retained, with users diverted via alternative existing routes (see Volume 2: Map CT-06-356, G6 to G7);
- realignment of the A538 Hale Road, crossing the route of the Proposed Scheme via a bridge deck across the retained cutting (see Volume 2: Map CT-06-356, H6);
- access to Manchester Airport High Speed Station (see Volume 2: Map CT-06-356, H6 to J6, and Map CT-06-357a, A6 to E6);
- closure of Ringway Footpath 8 where it would cross the route of the Proposed Scheme. A section on the western side of the route of the Proposed Scheme would be retained, with users diverted via alternative existing routes (see Volume 2: Map CT-06-356, H8 to I8);
- to accommodate the route of the Proposed Scheme Hasty Lane would be crossed by the Manchester Airport High Speed Station cutting, requiring alterations to the existing road (see Volume 2: Map CT-06-356, H6);

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- closure of Ringway Footpath 7 where it would cross the route of the Proposed Scheme. A section on the western side of the route of the Proposed Scheme would be retained, with users diverted via alternative existing routes (see Volume 2: Map CT-06-356, J7, and Map CT-06-356, A7);
- an area of woodland habitat creation along the western side of the Manchester Airport High Speed Station cutting, to provide replacement habitat (see Volume 2: Map CT-06-356, I5 to J5, and Map CT-06-356, A5 to C5);
- three ecological mitigation ponds within an area of grassland habitat creation to the west of the Proposed Scheme, south of Timperley Brook, to provide replacement habitat (see Volume 2: Map CT-06-356, J3 to J5, and Map CT-06-356, A3 to B5);
- Manchester Airport High Speed Station car park, 50m by 200m, adjacent to the western side of the M56 (see Volume 2: Map CT-06-357a, A6 to C6);
- Manchester Airport High Speed station, discussed in detail below (see Volume 2: Map CT-06-357a, B6 to D6);
- closure of Hale Footpath 16 where it would cross the route of the Proposed Scheme at Manchester Airport Station cutting (see Volume 2: Map CT-06-357a, B6 to C3);
- Timperley Brook inverted siphon, to carry Timperley Brook where it would cross the route of the Proposed Scheme near the eastern extent of Davenport Wood (see Volume 2: Map CT-06-357a, C5 to C6);
- An area of wetland habitat creation on both sides of the route of the Proposed Scheme, adjacent to the Timperley Brook inverted siphon to provide replacement habitat (see Volume 2: Map CT-06-357a, C5 to C6);
- realignment of Thorley Lane, 50m south of its existing alignment. The realigned Thorley Lane would cross the route of the Proposed Scheme on Thorley Lane overbridge, 90m in length and up to 2m above existing ground level, with an area of landscape mitigation planting on the eastern side. The existing Thorley Lane would be closed where it would cross the route of the Proposed Scheme (see Volume 2: Map CT-06-357a, E3 to E6);
- Manchester Tunnel South portal auto-transformer station, 50m by 50m, 175m north of Thorley Lane, with access via a new access track from the realigned Thorley Lane (see Volume 2: Map CT-06-357a, F5); and
- Manchester tunnel south portal¹⁸, 50m in length and 45m in width, at the southern end of the Manchester tunnel (see Volume 2: Map CT-06-357a, F5 to G6).

2.2.26 There would be maintenance access routes and hedgerow planting throughout this section. There would also be utilities works within this section, which may include

¹⁸ Tunnel portal building houses equipment, such as control equipment for the tunnel and ventilation fans for rail tunnel operations

works to low voltage overhead or underground lines, gas pipes, sewers and telecommunication cables.

2.2.27 Construction of this section would be managed from the following compounds:

- Castle Mill Lane satellite compound;
- River Bollin East satellite compound;
- M56 East satellite compound and transfer node;
- Sunbank Lane satellite compound;
- Manchester Airport station South satellite compound;
- Manchester Airport station main compound and transfer node; and
- Manchester Tunnel South portal main compound.

2.2.28 These are described in Section 2.3, and shown on map CT-05-355 and map CT-05-357a in the Volume 2: MAo6 Map Book.

Manchester Airport High Speed station

2.2.29 The proposed Manchester Airport High Speed station would provide an intermodal interchange serving HS2, Metrolink, cars, buses, coaches and taxis. It would occupy a linear site west of both the M56 and of Manchester Airport on land within the TMBC area. The railway would be in a deep cutting at this point (Manchester Airport Station cutting), before passing through the Manchester Airport High Speed station and then through Manchester tunnel south portal, prior to continuing through Manchester tunnel in the Davenport Green to Ardwick area (MAo7).

2.2.30 The proposed station would broadly occupy land between junctions 5 and 6 of the M56. The station building would be up to 68m wide and 20m high; reducing gradually in both height and width moving southwards, as the concourse would feed into a circulation spine. At its southern extremity the circulation spine would be up to 26m wide and 6m high. Moving further southwards beyond the circulation spine, would be a canopy, up to 106m long and 4m high. The overall length of the station building would be up to 448m (from the southern end of the platform canopy construction to the Northern end of the Metrolink concourse).

2.2.31 The Manchester Airport High Speed station would have up to four platforms. The station concourse would be at ground level, above the platform, which would be in a cutting 17m deep. Access from the concourse to the platform would be via escalators and lifts, with stairs provided for emergencies.

2.2.32 A multi-storey station car park would be provided south of the concourse, east of the route of the Proposed Scheme, with provision for up to 3,000 vehicle spaces distributed over five storeys. The station forecourt, east of the concourse would include space to provide:

- taxi drop off and pick up bays;
- private car drop off and pick up bays; and
- bus and coach parking bays.

- 2.2.33 The Proposed Manchester Airport High Speed station would incorporate HS2, Metrolink, cars, buses, coaches and taxis. The principal connection from the local highway network would be via a two-lane access road from the western carriageway of junction 6 of M56. A second connection would provide additional access for bicycles and emergency vehicles via Thorley Lane, to the north of the station.
- 2.2.34 Metrolink is the light rail (tram) system owned by Transport for Greater Manchester (TfGM), which operates throughout the Greater Manchester area. The Proposed Scheme includes provision for Metrolink platforms to be located at the north of the Manchester Airport High Speed station. They would be elevated 9m above ground level with an east to west orientation to provide access to the Manchester Airport High Speed station concourse and Manchester Airport.
- 2.2.35 There would be maintenance access routes and hedgerow planting throughout this section. There would also be utilities works within this section, which may include works to low voltage overhead or underground lines, gas pipes, sewers and telecommunication cables.
- 2.2.36 Construction of this section would be managed from the Manchester Airport Station south main compound and Manchester Airport Station north satellite compound, which are described in Section 2.3, and shown on Map CT-05-356 and Map CT-05-357a in the Volume 2: MAo6 Map Book.

Demolitions

- 2.2.37 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.
- 2.2.38 At this stage of the design development, it is anticipated that demolition of 21 existing residential properties, six commercial/business properties (including farm outbuildings) and three other structures would be required to construct the Proposed Scheme in the Hulseheath to Manchester Airport 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 Hulseheath to Manchester Airport area. The construction arrangements described in this section provide the basis for the assessment presented in this working draft ES.

- 2.3.2 Land used only for construction purposes would be restored as agreed with the owner of the land and the relevant planning authority once the construction works in that area are complete.
- 2.3.3 Land would be required permanently for the key features of the Proposed Scheme described in Section 2.2.
- 2.3.4 During the construction phase, public roads and PRoW routes would remain open for public use wherever reasonably practicable. Where such routes would cross the Proposed Scheme and require diversion, the alternative road or PRoW crossing the Proposed Scheme would be constructed prior to any closure of existing roads or PRoW wherever reasonably practicable. Where they would cross the Proposed Scheme in proximity to their existing alignment, a temporary alternative alignment may be required. In some instances, diverted or realigned roads or PRoW may need to pass through areas required for construction of the Proposed Scheme. Routes through these areas would be provided where it is safe and reasonably practicable to do so.
- 2.3.5 Volume 1, Section 5 and Section 6 provide details of the permanent features of the Proposed Scheme and typical construction techniques. For the purposes of the environmental assessment, standard construction techniques as provided in Volume 1, Section 6 have been assumed.

Code of Construction Practice

- 2.3.6 All contractors will be required to comply with a Code of Construction Practice (CoCP). In addition, Local Environmental Management Plans (LEMPs) will be produced for each local authority area. The CoCP and LEMPs will be the means of controlling the construction works associated with the Proposed Scheme, and set out monitoring requirements, with the objective of ensuring that the effects of the works on people and the natural environment are reduced as far 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 Framework¹⁹ 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;

¹⁹https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/625971/hs2_community_engagement_framework.pdf

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

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

Overview of the construction process

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

- advance works including: site investigations further to those already undertaken; preliminary mitigation works; preliminary enabling works;
- civil engineering works including: establishment of construction compounds; haul routes, site preparation and enabling works; main earthworks and structure works; 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);
- working hours (Section 5);
- management of construction traffic (Section 14); and
- handling of construction materials (Section 15).

Advance works

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

- further detailed site investigations and surveys for proposed construction compounds;

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

Engineering works

Introduction

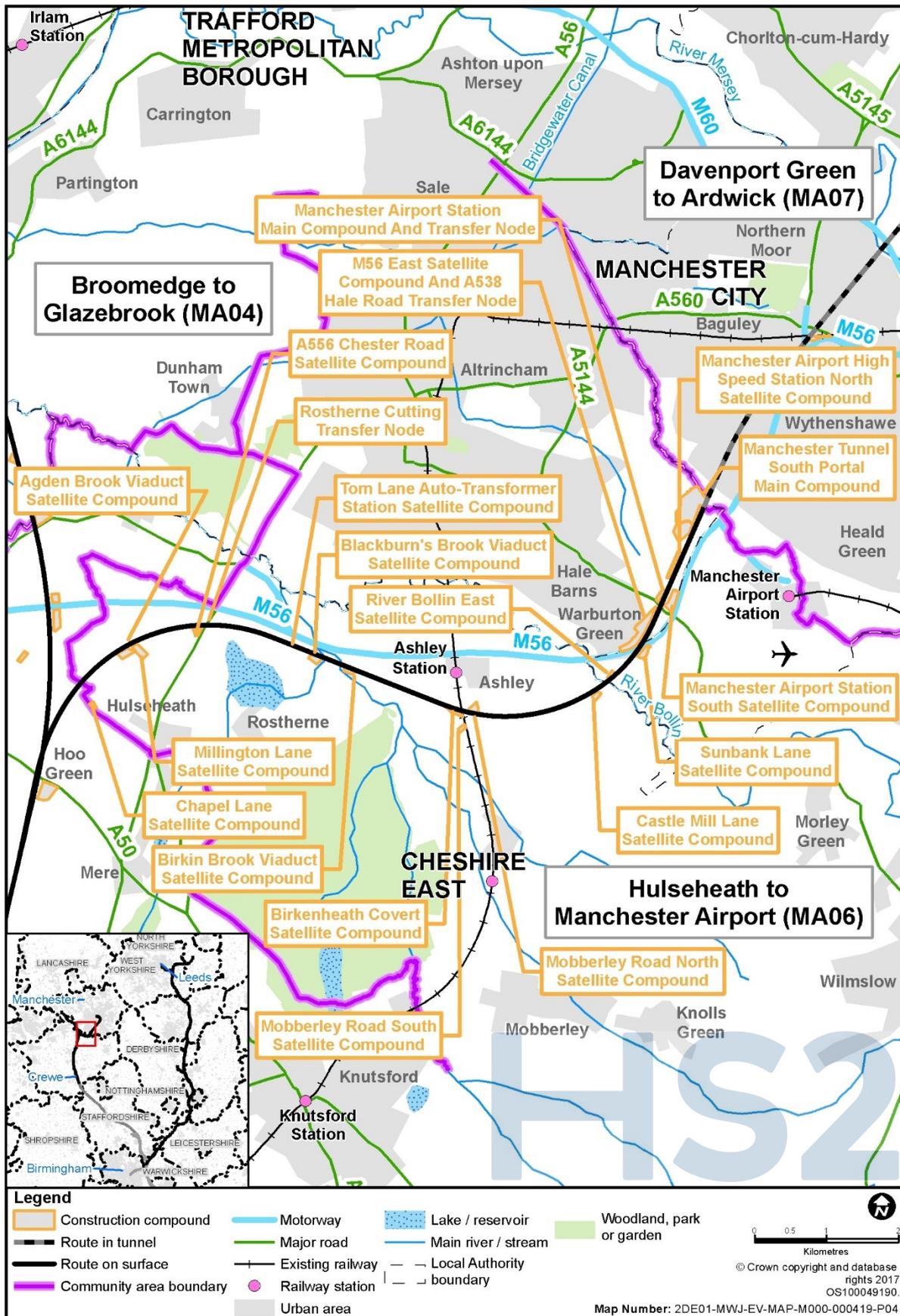
- 2.3.13 Construction of the Proposed Scheme would require the following broad types of engineering works along the entire length of the route, and within land adjacent to the route:
- civil engineering works, including earthworks such as embankments and cuttings and erection of bridges and viaducts; and
 - works to install, test and commission railway systems, including track, overhead line equipment, communications and signalling equipment and traction power supply.
- 2.3.14 The construction of track and railway systems works in open areas would include the installation of track form, rails, infill material, minor drainage works, and installation of electrification, signalling and communication equipment.
- 2.3.15 Part of the construction of the Proposed Scheme would take place on or immediately adjacent to the existing operational railway. Where possible, construction would be planned to normally take place at night, weekends or during bank holidays, so that there is less disruption to services.
- 2.3.16 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*
- 2.3.17 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.

- 2.3.18 Satellite compounds would be used as the base to manage specific works along a section of the route. Depending on the nature and extent of the works to be managed, these satellite compounds could include office accommodation for staff, local storage for plant and materials, car parking for staff and site operatives, and welfare facilities.
- 2.3.19 Fifteen civil engineering satellite compounds would be located in the Hulseheath to Manchester Airport area, three of which would continue to be used as railway installation satellite compounds following the completion of civil engineering works at those compounds.
- 2.3.20 Two main civil engineering compounds; the Manchester Airport station main compound and transfer node and the Manchester Tunnel South portal main compound would be located in the Hulseheath to Manchester Airport area. These main compounds would coordinate and manage activity at the 15 civil engineering satellite compounds in the Hulseheath to Manchester Airport area.
- 2.3.21 The locations of construction compounds in the Hulseheath to Manchester Airport area is shown on Figure 4. Map Series CT-05 (in the Volume 2: MAo6 Map Book) show in detail the locations of the construction compounds described below.

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Figure 4: Location of construction compounds in the Hulseheath to Manchester Airport area



- 2.3.22 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.
- 2.3.23 There would be no worker accommodation for construction workers in the Hulseheath to Manchester Airport area.
- 2.3.24 Soil stripped as part of the works, prior to it being used when the land is reinstated, would be stored for the duration of construction. The location of topsoil and subsoil storage areas would generally be adjacent to compounds and areas of construction activity. These areas are referred to as material stockpiles and those adjacent to compounds are shown on maps CT-05-201 to CT-05-209, in the Volume 2: MAo6 Map Book.
- 2.3.25 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

- 2.3.26 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.
- 2.3.27 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 Hulseheath to Manchester Airport area are described in the subsequent sections of this report.
- 2.3.28 It may be necessary to undertake minor works including a number of minor highways and junction improvements along public roads that would be used as construction traffic routes but are at a distance from the route of Proposed Scheme. These minor works will be reported in the formal ES.
- 2.3.29 Areas of land are also required for the storage, loading and unloading of bulk earthworks materials that are moved to and from the site on public roads. These areas would allow transfer of material between road vehicles and site vehicles during construction to balance traffic movements on the road network. These areas are referred to as transfer nodes and are shown on Map CT-05-202 and Map CT-05-203 in the Volume 2: MAo6 Map Book.

Construction compounds

- 2.3.30 This section provides a summary of the works to be managed from the construction compounds in the Hulseheath to Manchester Airport 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

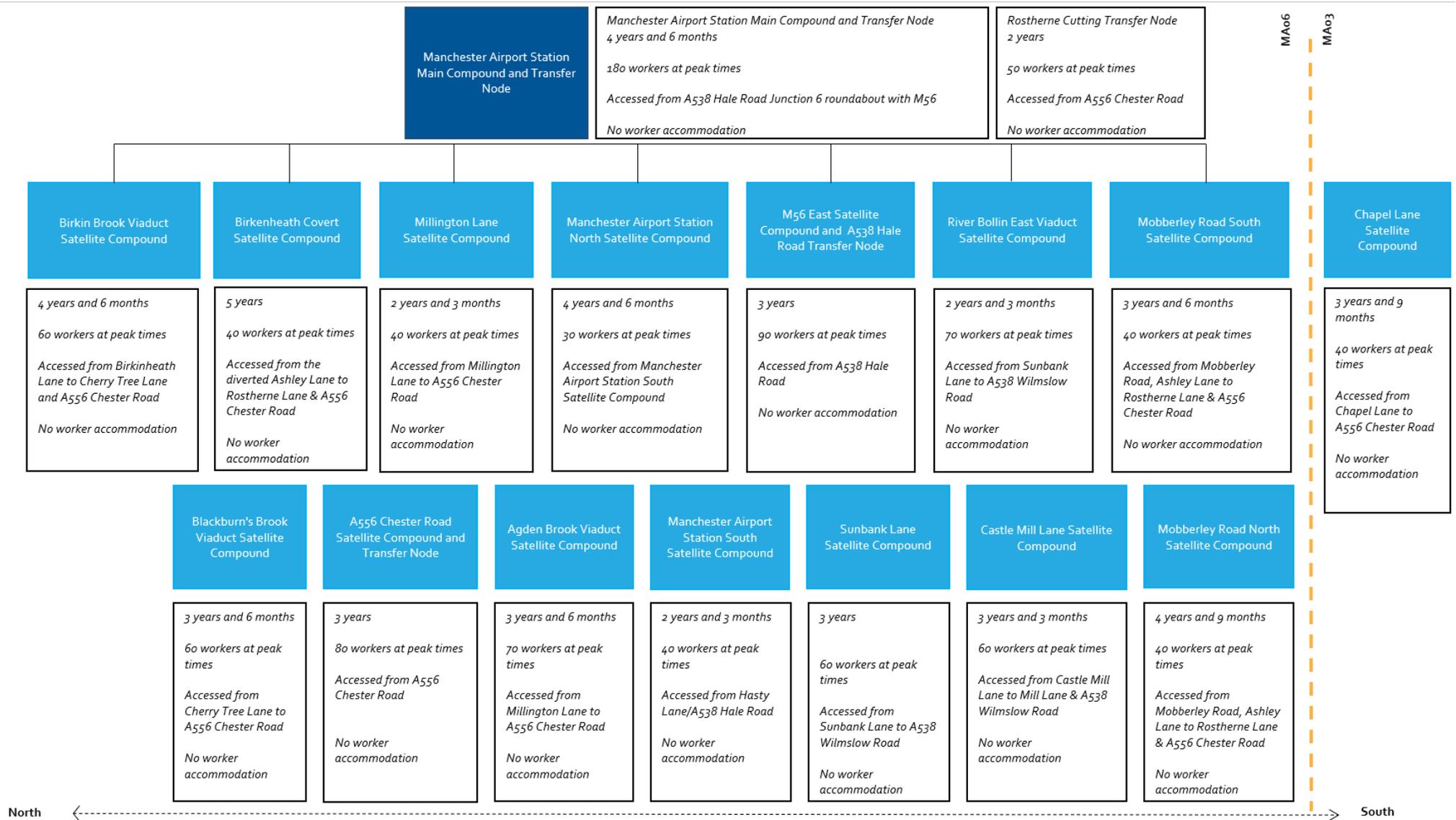
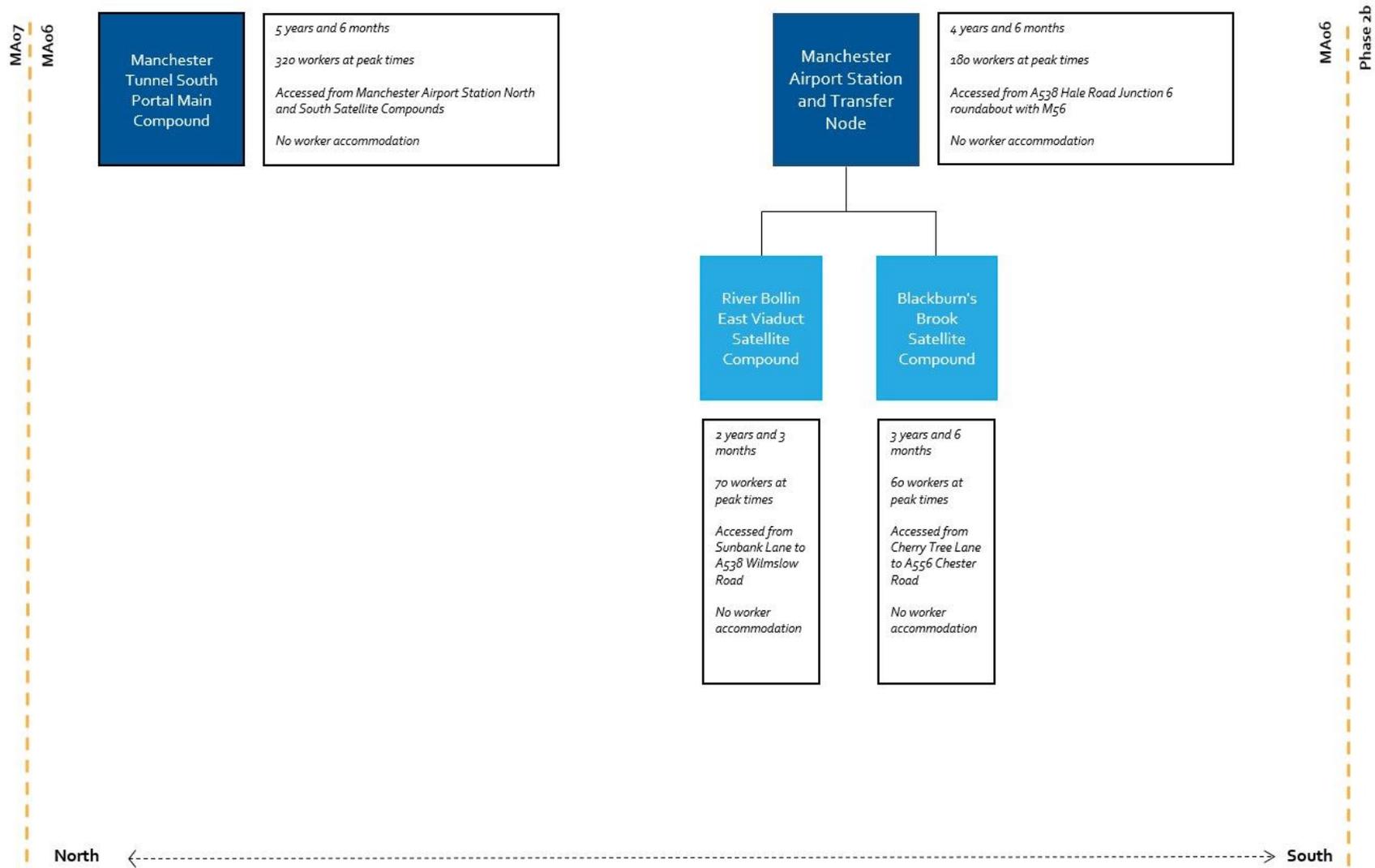


Figure 6: Construction compounds for railway systems works



Manchester Airport station main compound and transfer node

2.3.31 This compound (see Volume 2: Map CT-05-356, H6 to I7) would be used to manage both civil engineering and railway systems works and provide main compound support to all fifteen satellite compounds and transport nodes in the Hulseheath to Manchester Airport area, as illustrated in Figure 6 for the civil engineering works.

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

Table 1: Demolitions required as a result of the works to be managed from the Manchester Airport station south main satellite compound and transfer node

Description	Location	Feature resulting in the demolition
Residential		
Four residential properties on Hale Road	Hale Road, Hale Barns	Manchester Airport Station cutting
Residential care home	Cliffemount Community Care Home, Hale Barns	Manchester Airport Station cutting
Three residential properties on Hasty Lane	Hasty Lane, Hale Barns	Manchester Airport Station cutting
Commercial		
Hotel	Manchester Airport Marriott Hotel, Hale Road, Hale Barns	Manchester Airport Station cutting
Hotel	Hale Barns House Hotel, Hasty Lane, Hale Barns	Manchester Airport Station cutting
Other		
Electricity Sub-station	Hasty Lane, Hale Barns	Manchester Airport Station cutting

2.3.33 The compound would be used to manage the construction of Manchester Airport Station cutting, which would take one year and three months to complete.

2.3.34 The compound would be used to manage the construction of Manchester Airport High Speed station, (in conjunction with Manchester Airport Station North satellite compound), which would take four years and six months to complete.

2.3.35 Based on the current design detail, a simplified construction sequence for Manchester Airport High Speed station is proposed to be adopted as follows:

- Phase 1: enabling works will be carried out in advance of the main construction works including; ground investigation works, installing monitoring equipment, archaeological survey works and utility diversions (as described below);
- Phase 2: establishment of the construction compound, site haul routes, site clearance and excavation of ground. Demolition (as described below) and site clearance activities will be undertaken in this phase;
- Phase 3: installation of piles, excavation to form the basement and construction of ground beams and basement slabs;
- Phase 4: installation of tower cranes to facilitate placing of pre-cast units

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- Phase 5: lifting of the pre-cast panels into position to form the concrete superstructure up to concourse level consisting of columns, suspended slabs, and walls;
- Phase 6: construction of station steel superstructure up to roof level;
- Phase 7: installation of cladding panels to form the exterior walls;
- Phase 8: installation of the station roof and canopy structure;
- Phase 9: installation of mechanical, electrical and public health systems;
- Phase 10: internal station finishes including internal cladding, blockwork walls, windows, doors, flooring, and ceilings;
- Phase 11: external urban realm including footpaths, block paving, bollards and landscaping; and
- Phase 12: reinstatement, including the removal of site haul routes.

Manchester Tunnel South portal main compound

- 2.3.36 This compound (see Volume 2: Map CT-05-357a, D4 to H4) would be used to manage both civil engineering and railway systems works, as illustrated in Figure 6 for the civil engineering works.
- 2.3.37 No demolitions would be required as a result of the works to be managed from this compound.
- 2.3.38 The compound would be used to manage the construction of Thorley Lane Overbridge, which would take up to two years to complete.
- 2.3.39 The compound would be used to manage the construction of Manchester Airport Station cutting, which would take two years to complete.
- 2.3.40 The compound would be used to manage the construction of the following tunnel and associated infrastructure:
- 2.3.41 Manchester tunnel south portal, which would take two years to complete; and
- 2.3.42 Manchester tunnel (which is located in the Davenport Green to Ardwick area (MA07), which would take three years to complete.
- 2.3.43 The Tunnel Boring Machines (TBMs) for the construction of the Manchester tunnel would be driven from this compound.
- 2.3.44 Key railway systems works to be managed from this compound would include construction and installation of the tunnel portal which would take two years and six months to complete.
- 2.3.45 The compound would also manage railway systems works related to Manchester tunnel and its south portal.

- 2.3.46 The compound would be used to manage the removal of TBM, tunnel cleanout and removal of temporary works and placement of tunnel first stage concrete. All of these works would take one year to complete.

Agden Brook viaduct satellite compound

- 2.3.47 This compound (see Volume 2: Map CT-05-351, F6 to G6) would be used to manage civil engineering works in the Hulseheath to Manchester Airport area, as illustrated in Figure 5.
- 2.3.48 No demolitions would be required as a result of the works to be managed from this compound.
- 2.3.49 The compound would be used to manage the construction of Agden Brook viaduct (in conjunction with Chapel Lane viaduct satellite compound), which would take one year to complete.
- 2.3.50 The compound would be used to manage the construction of Rostherne cutting (in conjunction with Millington Lane satellite compound, A556 Chester Road satellite compound and transfer node), which would take two years and three months to complete.

Millington Lane satellite compound

- 2.3.51 This compound (see Volume 2: Map CT-05-351, G5 to H7) would be used to manage civil engineering works in the Hulseheath to Manchester Airport area, as illustrated in Figure 5.
- 2.3.52 No demolitions would be required as a result of the works to be managed from this compound.
- 2.3.53 The compound would be used to manage the construction of Rostherne cutting (in conjunction with Agden Brook viaduct satellite compound, A556 Chester Road satellite compound and transfer node), which would take two years to complete.
- 2.3.54 The compound would be used to manage the construction of Millington Lane overbridge, which would take two years and three months to complete.
- 2.3.55 Works to PRoW resulting from works to be managed from this compound include the realignment of Millington Footpath 7/2 on the northern side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period of one year and six months. On completion of construction, Millington Footpath 7/2 would be permanently diverted to the Millington Footpath 7/2 accommodation overbridge.

Chapel Lane satellite compound

- 2.3.56 This compound (see Volume 2: Map CT-05-351-R1, C3 to D3) would be used to manage civil engineering works in the Hulseheath to Manchester Airport (MAo6) as well as elements in the Pickmere to Agden and Hulseheath area (MAo3), as illustrated in Figure 5.
- 2.3.57 No demolitions would be required as a result of the works to be managed from this compound.

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- 2.3.58 The compound would be used to manage the construction of Agden Brook viaduct (in conjunction with Agden Brook viaduct satellite compound), which would take one year to complete.
- 2.3.59 The compound would be used to manage the construction of the following earthworks:
- Hulseheath embankment (located in the Pickmere to Agden and Hulseheath area (MAo3)), which would take one year and six months to complete; and
 - Millington embankment, which would take one year and six months to complete.
- 2.3.60 Works to PRow/public roads resulting from works to be managed from this compound include:
- realignment of Chapel Lane House accommodation access on the eastern side of the route of the Proposed Scheme, which would take two years and three months to complete; and
 - realignment of Millington Footpath 3/1 on the western side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period of one year and three months. On completion of construction, Millington Footpath 3/1 would be permanently diverted to the north of its existing alignment.

A556 Chester Road satellite compound and transfer node

- 2.3.61 This compound (see Volume 2: Map CT-05-352, F4 to G5) would be used to manage civil engineering works in the Hulseheath to Manchester Airport area, as illustrated in Figure 5.
- 2.3.62 The works to be managed from this compound would require demolition of the following buildings and structures, as described in Table 2.

Table 2: Demolitions required as a result of the works to be managed from Castle Mill Lane satellite compound

Description	Location	Feature resulting in the demolition
Commercial		
Four commercial units at Mere Plantations	Cherry Tree Lane, Rostherne	Rostherne cutting

- 2.3.63 The compound would be used to manage the construction of Rostherne cutting (in conjunction with Agden Brook viaduct satellite compound, Millington Lane satellite compound), which would take two years to complete.
- 2.3.64 This compound would manage a transfer node for the storage and loading and unloading of bulk earthworks materials, which would be moved to and from the site on public roads. The transfer node would be accessed from the A556 Chester Road and via site haul routes (Volume 2: Map CT-05-352, G5).
- 2.3.65 The compound would be used to manage the construction of the following:

- A556 Chester Road overbridge, which would take two years and three months to complete; and
- Millington Footpath 7/2 accommodation overbridge, which would take 2 years and three months to complete.

Blackburn's Brook satellite compound

- 2.3.66 This compound (see Volume 2: Map CT-05-353, F3 to G4) would be used to manage both civil engineering and railway systems works in the Hulseheath to Manchester Airport area, as illustrated in Figure 5 and Figure 7.
- 2.3.67 The works to be managed from this compound would require demolition of the following buildings and structures, as described in Table 3.

Table 3: Demolitions required as a result of the works to be managed from Blackburn's Brook satellite compound

Description	Location	Feature resulting in the demolition
Residential		
Residential property and outbuildings	Bowdon View Farm, Yarwoodheath Lane, Rostherne	Rostherne cutting
Two residential properties on Yarwoodheath Lane	Yarwoodheath Lane, Rostherne	Rostherne cutting

- 2.3.68 The compound would be used to manage the construction of Blackburn's Brook viaduct (in conjunction with Birkin Brook satellite compound), which would take two years to complete.
- 2.3.69 The compound would be used to manage the construction of Blackburn's Brook embankment, which would take one year and six months to complete.
- 2.3.70 Key railway systems works to be managed from this compound would include construction and installation of the Tom Lane auto-transformer station, located 420m east of Tom Lane. The construction of the Tom Lane auto-transformer station foundations and building would take one year to complete. The installation of the Tom Lane auto-transformer station railway systems equipment would take one year and one month to complete. Construction works for the Tom Lane auto-transformer station would be accessed from the Tom Lane road followed by a site haul route along the trace.

Birkin Brook viaduct satellite compound

- 2.3.71 This compound (see Volume 2: Map CT-05-353, I3 to I4) would be used to manage civil engineering works in the Hulseheath to Manchester Airport area, as illustrated in Figure 5.
- 2.3.72 No demolitions would be required as a result of the works to be managed from this compound.
- 2.3.73 The compound would be used to manage the construction of Blackburn's Brook viaduct (in conjunction with Blackburn's Brook viaduct satellite compound), which would take two years to complete.

- 2.3.74 The compound would be used to manage the construction of the following earthworks:
- Rostherne embankment, which would take one year and six months to complete; and
 - Ashley embankment (in conjunction with Birkinheath Covert satellite compound, Mobberley Road North satellite compound and Castle Mill Lane satellite compound), which would take two years and nine months to complete.

- 2.3.75 Works to PRow/public roads resulting from works to be managed from this compound include:
- realignment of Ashley Footpath 3/1 on the northern side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period of two years and three months to complete. On completion of construction, Ashley Footpath 3/1 would be permanently diverted to the east of its existing alignment; and
 - realignment of Ashley Road on the northern side of the route of the Proposed Scheme, which would take two years and three months to complete.

Birkinheath Covert satellite compound

- 2.3.76 This compound (see Volume 2: Map CT-05-354, G6 to I6) would be used to manage civil engineering works in the Hulseheath to Manchester Airport area, as illustrated in Figure 6.

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

- 2.3.78 The compound would be used to manage the construction of Ashley embankment (in conjunction with Birkin Brook viaduct satellite compound, Mobberley Road North satellite compound and Castle Mill Lane satellite compound), which would take one year and nine months to complete.

- 2.3.79 The compound would be used to manage the construction of the following:
- Birkinheath Covert (Railway) underbridge, which would take two years and six months to complete; and
 - Ashley Footpath 6/5 Accommodation overbridge, which would take two years and three months to complete.

- 2.3.80 Works to PRow/public roads resulting from works to be managed from this compound include:
- realignment of Lamb Lane on the southern side of the route of the Proposed Scheme, which would take one year and six months to complete;
 - realignment of Ashley Footpath 7/1 on the southern side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period of one year and six months. On completion of

construction, Ashley Footpath 6/4 would be permanently diverted via Ashley Footpath 6/5 Accommodation overbridge;

- realignment of Ashley Footpath 6/4 on the southern side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period of one year and six months. On completion of construction, Ashley Footpath 6/4 would be permanently diverted via Ashley Footpath 6/5 Accommodation overbridge; and
- temporary closure of Ashley Footpath 6/5 to the north of the route of the Proposed Scheme for a period of two years and three months. On completion of construction, users would be diverted via Ashley Footpath 6/5 Accommodation overbridge.

Mobberley Road North satellite compound

- 2.3.81 This compound (see Volume 2: Map CT-05-354, I4 to J5) would be used to manage civil engineering works in the Hulseheath to Manchester Airport area, as illustrated in Figure 5.
- 2.3.82 No demolitions would be required as a result of the works to be managed from this compound.
- 2.3.83 The compound would be used to manage the construction of Ashley embankment (in conjunction with Birkin Brook viaduct satellite compound, Birkinheath Covert satellite compound and Castle Mill Lane satellite compound), which would take two years to complete.
- 2.3.84 The compound would be used to manage the construction of the following:
- Birkinheath Covert (Railway) underbridge (in conjunction with Birkinheath Covert satellite compound), which would two years and nine months to complete;
 - Mobberley Road underbridge, which would two years and nine months to complete; and
 - Back Lane accommodation overbridge, which would three years to complete.

Mobberley Road South satellite compound

- 2.3.85 This compound (see Volume 2: Map CT-05-354, I7 to I8) would be used to manage civil engineering works in the Hulseheath to Manchester Airport area, as illustrated in Figure 5.
- 2.3.86 Works to PRow/public roads resulting from works to be managed from this compound include the realignment of Mobberley Road, which would take two years and three months to complete.

Castle Mill Lane satellite compound

- 2.3.87 This compound (see Volume 2: Map CT-05-355, I6 to J7) would be used to manage both civil engineering and railway systems works in the Hulseheath to Manchester Airport area, as illustrated in Figure 5 and Figure 6.

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

Table 4: Demolitions required as a result of the works to be managed from Castle Mill Lane satellite compound

Description	Location	Feature resulting in the demolition
Residential		
Residential property and outbuildings	Higher Thorns Green Farm, Castle Mill Lane, Ashley	Ashley cutting
Four residential properties on Castle Mill Lane	Castle Mill Lane, Ashley	Ashley cutting
Five residential properties on Sunbank Lane	Sunbank Lane, Ringway, Altrincham	Warburton Green retaining wall
Other		
Two stables	Off Back Lane, Ashley, Altrincham	Ashley cutting

2.3.89 The compound would be used to manage the construction of the River Bollin East viaduct (in conjunction with River Bollin East viaduct satellite compound), which would take one year to complete.

2.3.90 The compound would be used to manage the construction of the Castle Mill Lane overbridge, which would take two years and three months to complete.

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

- Ashley embankment (in conjunction with Birkin Brook viaduct satellite compound, Birkinheath covert satellite compound and Mobberley Road North satellite compound), which would take one year and nine months to complete;
- Thorns Green cutting, which would take two years to complete; and
- River Bollin south embankment, which would take one year and six months to complete.

2.3.92 Works to public roads resulting from works to be managed from this compound include the realignment of Brickhill Lane on the southern side of the route of the Proposed Scheme, which would take one year and three months to complete.

2.3.93 Key railway systems works to be managed from this compound would include construction and installation of the Sunbank Lane auto-transformer station. The installation of the Sunbank Lane auto-transformer station railway systems equipment would take one year and one month to complete. Construction works for the Sunbank Lane auto-transformer station would be accessed from Sunbank Lane to the A538 Wilmslow Road.

River Bollin East satellite compound

2.3.94 This compound (see Volume 2: Map CT-05-356, B6) would be used to manage both civil engineering and railway systems works in the Hulseheath to Manchester Airport area, as illustrated in Figure 5 and Figure 6.

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- 2.3.95 No demolitions would be required as a result of the works to be managed from this compound.
- 2.3.96 The compound would be used to manage the construction of River Bollin East viaduct (in conjunction with Castle Mill Lane satellite compound), which would take one year to complete.
- 2.3.97 The compound would be used to manage the construction of the following earthworks:
- River Bollin North embankment, which would take one year and six months to complete; and
 - Halebank cutting (in conjunction with Sunbank Lane satellite compound), which would take one year and nine months to complete.

Sunbank Lane satellite compound

- 2.3.98 This compound (see Volume 2: Map CT-05-356, D7 to E8) would be used to manage civil engineering works in the Hulseheath to Manchester Airport 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 The compound would be used to manage the construction of the following earthworks:
- Halebank cutting (in conjunction with River Bollin East viaduct satellite compound), which would take one year and nine months to complete; and
 - M56 cutting, which would take nine months to complete.
- 2.3.101 The compound would be used to manage the construction of Sunbank Lane overbridge, which would take two years and three months to complete;
- 2.3.102 The compound would be used to manage the construction of M56 East box structure (in conjunction with M56 East satellite compound and transfer node), which would take three years to complete.
- 2.3.103 Works to PRow/public roads resulting from works to be managed from this compound include:
- realignment of Ringway Footpath 11 on the western side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period of two years and three months. On completion of construction, Ringway Footpath 11 would be permanently diverted via to the north via Sunbank Lane overbridge; and
 - realignment of Ringway Footpath 12 on the western side of the route of the Proposed Scheme. During construction, users would be diverted via alternative routes for a period of two years and three months. On completion of construction, Ringway Footpath 12 would be permanently diverted via to the north via Sunbank Lane overbridge.

M56 East satellite compound and A538 Hale Road transfer node

- 2.3.104 This compound (see Volume 2: Map CT-05-356, D5 to H6) would be used to manage civil engineering works in the Hulseheath to Manchester Airport area, as illustrated in Figure 5.
- 2.3.105 No demolitions would be required as a result of the works to be managed from this compound.
- 2.3.106 The compound would be used to manage the construction of Manchester Airport Station cutting, which would take nine months to complete.
- 2.3.107 The compound would be used to manage the construction of M56 east box structure (in conjunction with Sunbank Lane satellite compound), which would take three years to complete.
- 2.3.108 Works to public roads resulting from works to be managed from this compound include the realignment of the A538 Hale Road on the western side of the route of the Proposed Scheme (in conjunction with the Manchester Airport station South satellite compound), which would take two years and three months to complete.

Manchester Airport Station South satellite compound

- 2.3.109 This compound (see Volume 2: Map CT-05-356, H5 to I6) would be used to manage civil engineering works in the Hulseheath to Manchester Airport area, as illustrated in Figure 5.
- 2.3.110 No demolitions would be required as a result of the works to be managed from this compound.
- 2.3.111 Works to public roads resulting from works to be managed from this compound include the realignment of the A538 Hale Road on the western side of the route of the Proposed Scheme (in conjunction with the M56 East satellite compound), which would take two years and three months to complete.

Manchester Airport Station North satellite compound

- 2.3.112 This compound (see Volume 2: Map CT-05-357a, A5 to C5) would be used to manage civil engineering works in the Hulseheath to Manchester Airport area, as illustrated in Figure 5.
- 2.3.113 No demolitions would be required as a result of the works to be managed from this compound.
- 2.3.114 The compound (in conjunction with Manchester Airport Station main compound and transfer node) would be used to manage the construction of Manchester Airport High Speed station, which would take four years and six months to complete.

Construction waste and material resources

- 2.3.115 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.

- 2.3.116 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.
- 2.3.117 Local excess or shortfall of excavated material within the Hulseheath to Manchester Airport area would be managed through the mitigation earthworks design approach adopted for the Proposed Scheme, with the aim of contributing to an overall balance of excavated material on a route-wide basis. The overall balance of excavated material will be presented in Volume 3 of the Final ES.

Commissioning of the railway

- 2.3.118 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

- 2.3.119 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

- 2.3.120 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.
- 2.3.121 The CoCP and the relevant LEMP would set out inspection and monitoring procedures to assess the effectiveness of measures to prevent or reduce environmental effects during construction. Relevant local authorities and consenting authorities, such as the Environment Agency, would be consulted on the monitoring procedures to be implemented prior to construction commencement.

2.4 Operation of the Proposed Scheme

Introduction

- 2.4.1 This section describes the operational characteristics of the Proposed Scheme in the Hulseheath to Manchester Airport area. Volume 1, Section 4 describes the envisaged operational characteristics of the Proposed Scheme as a whole, including Phase One, Phase 2a and Phase 2b.

HS2 services

- 2.4.2 It is anticipated that there would be up to six trains per hour each way passing through the Hulseheath to Manchester Airport 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 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 will be undertaken for the Proposed Scheme as a whole and reported in Volume 3, Route-wide effects of the formal ES.
- 2.4.8 Forecasts of the amount of waste arising from track maintenance and ancillary infrastructure and the associated potential significant environmental effects will also be reported in the formal ES.

Monitoring during operation

- 2.4.9 The nominated undertaker would be responsible for monitoring during operation of the Proposed Scheme. Proposed indicative area-specific monitoring measures for each environmental topic area are presented in Sections 4 to 15 of this report based on the current level of assessment.
- 2.4.10 Relevant local authorities and consenting authorities, such as the Environment Agency, will be consulted on the monitoring procedures to be implemented during operation prior to construction commencement.

2.5 Route section alternatives

Highway alignment at Mobberley Road

- 2.5.1 As part of the design development process since July 2017, consideration has been given to the design of highway diversions to reduce potential adverse impacts on residents of Ashley.
- 2.5.2 The Proposed Scheme would pass south of the village of Ashley on the Ashley embankment and would require the closure of Ashley Road, and the diversion of Lamb Lane and Mobberley Road.
- 2.5.3 As part of the development of the design, further work is being undertaken to consider the construction and engineering options in this area.
- 2.5.4 Further studies will be carried out to consider the location and the design of highway diversions and could result in the HS2 main line vertical alignment being altered in this area. Any changes would be included in the Proposed Scheme and the outcome of these studies would be reported in the formal ES.

Manchester Airport High Speed station

- 2.5.5 As part of the design development process since July 2017, consideration has been given to the permanent layout of the Manchester Airport High Speed station, the location of the car park and the provision for a potential connection to the Metrolink.
- 2.5.6 The Proposed Scheme would include a shared concourse with Metrolink, situated at the north end of the station. The concourse would be located at ground level, above the station platforms. A multi-storey car park would be located to the east of the route of the Proposed Scheme.
- 2.5.7 As part of the development of the design, further work is being undertaken to consider the location and configuration of the station platforms and the location of the shared concourse with Metrolink to improve pedestrian flow through the station and reduce intermodal journey times. The location and form of the car park is also being considered to ensure optimal connection with the station building to reduce walk time and enhance pedestrian circulation.
- 2.5.8 An important element of the ongoing design development is consideration of designs for how to accommodate up to four platforms, which would allow use of the Manchester spur by Northern Power Rail services; an outcome sought by local authorities and regional and local transport bodies. Further studies will be carried out to consider the construction and engineering options at the Manchester Airport High Speed station 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.
- 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 5.

Table 5: 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 Hulseheath to Manchester Airport 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 Hulseheath to Manchester Airport area since the initial preferred route announcement in November 2016, and which are informing the Proposed Scheme are:
- temporary and permanent land requirements;
 - interface with the A556 and the crossing under the M56;
 - the proposed Manchester Airport High Speed station and its interface with existing transport modes including the Metrolink, highways and wider development proposals;
 - proximity to Rostherne Mere (site of special scientific interest (SSSI), Ramsar and National Nature Reserve);
 - the impact on Hancock's Bank Ancient Woodland;
 - provision of access to severed agricultural land, including access under viaducts and the provision of farm access tracks;
 - proximity to and impact on local communities, in particular at Ashley, Thorns Green, Hale Barns, Halebank and Warburton Green, both during construction and operation with temporary and permanent road diversions;

- the number and configuration of platforms at Manchester Airport station to allow efficient future integration of Northern Powerhouse Rail (NPR) services; and
- crossing of Timperley Brook at the Manchester Airport High Speed station and the impact on connecting water courses downstream.

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 Hulseheath to Manchester Airport area include a range of local interest groups, local facility and service providers, places of worship, schools and educational establishments, cultural, leisure and sports stakeholders.

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

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

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

3.4.5 Table 6 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 6: Engagement to date with community stakeholders

Stakeholder	Area of focus
Hale Barns residents	Engagement over the impact of construction traffic, temporary and permanent road diversions
Cliffemount Care Services	Engagement over timescales and process for acquisition

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Fairfield Residential Ltd	Meeting to discuss the potential need to relocate the Fairfield residential care home for people with learning disabilities that is located near to the construction works.
Ashley Residents	Meeting to discuss the potential construction and operational impacts upon homes and local businesses
Childrens' Adventure Farm Trust	Meeting to discuss construction related visual, noise, traffic, road diversion impacts
Bucklow Manor Care Home	Engagement over impact of construction traffic and road diversion

Local authorities and parish councils

- 3.4.6 Direct engagement has been offered to and undertaken with county, borough, district and parish councils within the Hulseheath to Manchester Airport area. The purpose of this engagement is to collate local baseline information and knowledge to inform the design and assessment, identify and understand local issues and concerns, provide access to wider stakeholders and communities and provide a mechanism for ongoing dialogue and discussion on the assessment and design development.
- 3.4.7 Engagement has focused on the technical areas which inform the assessment, including, landscape and visual, sound, noise and vibration and traffic and transport, amongst others topics.
- 3.4.8 Key issues identified during engagement with local authorities and parish councils include those summarised in Table 7.

Table 7: Engagement to date with local authorities and parish councils

Stakeholder	Area of focus
Cheshire East Council (CEC)	General introductory and project update meetings including discussion on highway realignments, integration with local authority transport strategy and regeneration opportunities, as well as noise and visual impacts on Ashley during the construction and operation of HS2.
	Meetings with technical leads to collate data and discuss key assessment topics including: air quality; geotechnics; highways; land quality; sound, noise and vibration; traffic and transport, and waste.
Manchester City Council (MCC)	General introductory and project update meetings including engagement over impact on communities, businesses and emergency services during construction.
	Meetings with technical leads to collate data and discuss key assessment topics including: air quality; land quality; sound, noise and vibration; traffic and transport, and waste.
Trafford Metropolitan Borough Council (TMBC)	Engagement over concerns regarding impacts from construction and traffic. Specific resident's issues related to their land and property.
	Meetings with technical leads to collate data and discuss key assessment topics including: air quality; geotechnics; land quality; sound, noise and vibration; traffic and transport, and waste.
Ashley Parish Council	Meeting to discuss the impacts of the proposed highways diversions and the closure of Ashley Road upon traffic, noise and visual intrusion during construction. Operational issues discussed included visual, noise, lighting, traffic and agricultural impacts.

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<p>Greater Manchester Combined Authority, Manchester City Council and Trafford Metropolitan Borough Council</p>	<p>General introductory and project update meetings including discussion over Metrolink, connectivity to the Manchester Airport High Speed station, proposed Masterplan development sites, connectivity to the strategic road network, local road network, airport and surrounding planned and potential developments and car parking.</p>
	<p>Discussion in regard to the Airport Station, and provision sought by local authorities for:</p> <ul style="list-style-type: none"> • Metrolink with an integrated stop; • connectivity between the Manchester Airport High Speed station and their proposed Masterplan development sites; • potential to integrate NPR services with proposed HS2 rail infrastructure and stations; • allowance for their Masterplan development sites to the west of the proposed Manchester Airport High Speed station; • connectivity to the strategic road network, local road network, airport and surrounding planned and potential developments (including improved highway/public transport links; and • appropriate car parking provision to serve the station.

3.4.9 Councils will continue to be engaged as part of the design development of the Proposed Scheme with ongoing dialogue on key topics such as highways, PRow and the draft Code of Construction Practice (CoCP)²⁰.

Expert, technical and specialist groups

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

- Animal and Plant Health Agency;
- British Geological Survey;
- Campaign to Protect Rural England;
- Canal & River Trust;
- Coal Authority;
- Department of Environment, Food and Rural Affairs;
- Environment Agency;
- Fera Science Ltd;
- Forestry Commission;
- Highways England;
- Historic England;
- Inland Waterways Association;

²⁰ Supporting document: Draft Code of Construction Practice

- Manchester Airport Group;
- National Farmers Union;
- National Trust;
- Natural England;
- Network Rail;
- Public Health England;
- Ramblers Association;
- Royal Agricultural Society;
- Royal Society for the Protection of Birds;
- Royal Society of Wildlife Trusts/The Wildlife Trusts;
- Transport for Greater Manchester;
- Transport for the North; and
- Woodland Trust.

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

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

Utilities

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

Directly affected individuals, major asset owners and businesses

3.4.14 This group includes those with property potentially affected by the Proposed Scheme, including individuals, major asset owners and businesses within the Hulseheath to Manchester Airport area.

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

reduce the loss of agricultural land and the location of accommodation overbridges across the route will be considered to better reflect the needs of farmers.

- 3.4.16 Information gathered from 15 farm visits have informed the assessment presented in this working draft ES. Farm visits are ongoing and engagement will continue as the design and assessment develops.
- 3.4.17 Engagement is also continuing with key representatives for the farmers and growers industry, in particular with the National Farmers Union and Country Land and Business Association.
- 3.4.18 A route-wide programme of engagement is ongoing, in parallel to the working draft ES process. This engagement provides affected individuals, major asset owners and businesses the opportunity to raise issues and opportunities in relation to the Proposed Scheme and to gain an understanding of compensation and assistance available for property owners. Within the Hulseheath to Manchester Airport area, an information event was held at Best Western Manchester Altrincham Cresta Court on 9 July 2018. Facilities were available at the event for affected individuals, major asset owners and businesses to have private meetings with HS2 staff.
- 3.4.19 Engagement has been undertaken with Tatton Estates Management, Royal London Asset Management, Manchester Airport Group and the Marriott Hotel.
- 3.4.20 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 Hulseheath to Manchester Airport area (MAo6). 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 Guide²¹.
- 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: MAo6 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)²².
- 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)²³ system, which classifies agricultural

²¹ 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>

²² Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

²³ 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

land into five grades from excellent quality Grade 1 land to very poor quality Grade 5 land. Grade 3 is subdivided into Subgrades 3a and 3b. The main issue in the assessment of the impacts on agricultural land is the extent to which land of 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 Hulseheath to Manchester Airport 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 Hulseheath to Manchester Airport area is provided in Section 10, Land quality and Section 15, Water resources and flood risk.
- 4.3.3 The majority of the Hulseheath to Manchester Airport area is underlain by glacial till²⁴ (Devensian). These deposits comprise poorly sorted sandy, silty clay. Where glacial till is not mapped, the following superficial deposits are identified:
- alluvium, which variably comprises silty clay, silt, sand and gravel, are mapped along Agden Brook, Birkin Brook, River Bollin and underlying Rostherne Mere; and
 - glaciofluvial sheet deposits comprising sand and gravel are present surrounding the alluvium along the Agden Brook, Birkin Brook and to a lesser extent in the valley of the River Bollin.
- 4.3.4 An area of Shirdley Hill Sand Formation, comprising sand, is present at the north-western extent of the study area to the west of Spodegreen Farm.
- 4.3.5 The bedrock geology in the study area mainly comprises the Bollin Mudstone Member of the Mercia Mudstone Group. It is typically described as mudstone and siltstone with some halite-bearing units and sandstone. Where the Bollin Mudstone Member is not recorded, the following bedrock geology is indicated:
- the Tarporley Siltstone Formation (Mercia Mudstone Group) is present from the start of the area to Agden Brook, and where the route of the Proposed Scheme would intersect the Mid-Cheshire Line at Ashley; and
 - a small area of Helsby Sandstone Formation (Sherwood Sandstone Group) is present from Agden Brook to an area north-east of Millington Lane.

Topography and drainage

- 4.3.6 The Hulseheath to Manchester Airport area is characterised by undulating countryside with mainly gentle to moderate gradients (angle of slope between two and seven degrees). There are some moderate to strong slopes (four to 11 degrees) on valley sides flanking the River Bollin.
- 4.3.7 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

²⁴ 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

in 100 or greater annual probability of river flooding. The flood zones are associated with Birkin Brook and the River Bollin. Other floodplains that would be crossed by the route of the Proposed Scheme include those associated with Agden Brook, Blackburn's Brook and Timperley Brook. Further details are provided in Section 15, Water resources and flood risk.

Description and distribution of soil types

- 4.3.8 The broad characteristics of the soils likely to be present in the study area are described by the Soil Survey of England and Wales²⁵ and their general distribution is shown on the National Soil Map²⁶. Soils possessing similar characteristics are amalgamated into associations.
- 4.3.9 There are three known groups of soil associations in this study area. The presence of each group has been confirmed in part of the study area by detailed soil survey data obtained from publicly available survey records.
- 4.3.10 Slowly permeable and seasonally waterlogged clay loam soils over clay in the Salop association (Wetness Class²⁷ (WC) III to IV) are predominant in this study area. These slowly permeable soils are developed in reddish glacial deposits, i.e. till and glaciofluvial sand and gravel deposits, mainly overlying Bollin Mudstone.
- 4.3.11 There is a small proportion of deep, permeable sandy and sandy loam soils in the Blackwood association developed on variably stony, glacial river terrace deposits in the central and northern parts of the area. Where undrained, the Blackwood soils are waterlogged for long periods during the winter (WC IV). The soil profiles experience fluctuating levels of groundwater. In parts where the water-table has been lowered, the soils are well drained (WC I) or only occasionally waterlogged (WC II).
- 4.3.12 There is an isolated pocket of deep, well drained (WC I) sandy loam over loamy sand soils in the Wick 1 association in the south of the study area. This type of soil generally gives rise to high quality land.

Soil and land use interactions

Agricultural land quality

- 4.3.13 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.

²⁵ 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

²⁶ Cranfield University (2001), *The National Soil Map of England and Wales 1:250,000 scale*. Cranfield University: National Soil Resources Institute

²⁷ The Wetness Class (WC) of a soil is classified in Appendix II of Hodgson, J.M. (1977), *The Soil Survey Field Handbook*. Soil Survey and Land Research Centre, Technical Monograph No.5, according to the depth and duration of waterlogging in the soil profile and has six bands ranging from Wetness Class I (well drained) to Wetness Class VI (permanently waterlogged).

- 4.3.14 The main soil properties that affect the cropping potential and management requirements of land are texture, structure, depth, stoniness and chemical fertility.
- 4.3.15 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 droughtiness²⁸ limitations of the land.
- 4.3.16 The local agro-climatic data have been interpolated from the Meteorological Office's standard 5km grid point dataset²⁹ for three points within the study area. These data show climate in the area to be cool and moist. The number of Field Capacity Days³⁰ (FCDs), when the moisture deficit³¹ is zero, ranges from 193 to 200 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.
- 4.3.17 Site factors include gradient and microrelief³², and these are potentially limiting to agricultural land quality within this study area. This includes strongly sloping valley sides flanking the River Bollin where gradient limits the quality of agricultural land to Subgrade 3b, i.e. where the angle of slope is between seven and 11 degrees.
- 4.3.18 Flood risk limits the quality of agricultural land to Subgrade 3b or Grade 4 in the floodplain of the Birkin Brook and the River Bollin. Further details are provided in Section 15, Water resources and flood risk.
- 4.3.19 The main physical limitations that result from interactions between soil, climate and site factors are soil wetness, soil droughtiness and a localised susceptibility to erosion. For soil wetness, each soil is allocated a Wetness Class based on soil structure, evidence of waterlogging and the number of FCDs. The topsoil texture then determines its ALC grade. Soil droughtiness is determined by the moisture retention of different soil textures and thickness of each soil horizon, soil structures, stone content and moisture deficits.
- 4.3.20 The predominant group of soils in this study area, the Salop association, is slowly permeable and seasonally waterlogged for long periods during the winter (WC IV). In a climate area with between 193 and 200 field capacity days, soil profiles with heavy clay loam topsoil are limited by soil wetness to Grade 4.

²⁸ A measure of the likely moisture stress in a crop arising from the crop's requirement for water exceeding the available water capacity in the soil

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

³⁰ Field Capacity Days (FCD) is a meteorological parameter which estimates the duration of the period when the soil moisture deficit is zero. Soils usually return to field capacity (zero deficit) during the autumn or early winter and the field capacity period, measured in days, ends in the spring when evapotranspiration exceeds rainfall and a moisture deficit begins to accumulate.

³¹ The moisture deficit is a crop-related meteorological variable which represents the balance between rainfall and potential evapotranspiration calculated over a critical portion of the growing season

³² 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

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.

- 4.3.21 Where the land is undrained, and seasonally waterlogged for long periods during the winter (WC IV), the deep, permeable sandy and sandy loam soils in the Blackwood association are limited by soil wetness to Subgrade 3b in this climate area (193-200 field capacity days). Where the land is under-drained, and the soil profiles are in WC I or WC II, the quality of the agricultural land may be increased to Grade 2/Subgrade 3a, depending on how droughty the soils are during the growing season.
- 4.3.22 The quality of agricultural land with well-drained (WC I), sandy loam soils in the Wick 1 association is limited by soil droughtiness to Grade 2 or Subgrade 3a.
- 4.3.23 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 mapping³³ shows that there is a moderate likelihood of encountering BMV agricultural land in the locality, which makes such land a resource of medium sensitivity in this study area.
- 4.3.24 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).

Other soil interactions

- 4.3.25 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 England³⁴ and the Government's White Paper, *The Natural Choice: securing the value of nature*³⁵, 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;

³³ Defra (2005), *Likelihood of Best and Most Versatile Agricultural Land*

³⁴ Defra (2009), *Soil Strategy for England*

³⁵ HM Government (2011), *The Natural Choice: securing the value of nature*

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

4.3.26 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.

4.3.27 Within the study area, the floodplains of the Birkin Brook and the River Bollin 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

4.3.28 The Hulseheath to Manchester Airport area is located on the Cheshire Plain, which is a dairy farming region. Arable land is more commonly associated with pockets of permeable and well drained sandy soils. The gently undulating, predominantly grassland is divided into small, irregularly shaped fields separated by hedgerows, oak trees and many small woods, often planted as game cover.

4.3.29 The larger woodlands in the study area are located near the Agden Brook, to the north of Rostherne Mere, and flanking Blackburn's Brook and Birkin Brook. There are some small blocks of woodland to the south-east of Ashley, and woodland alongside the River Bollin. No commercial forestry has yet been identified in this study area. As described in Section 7, Ecology and biodiversity, there is some ancient woodland on land required for the Proposed Scheme alongside Blackburn's Brook.

4.3.30 Agricultural land from Hulseheath to Millington Road falls within a nitrate vulnerable zone for surface water (2017). Between Millington Road and Rostherne Mere, the area falls within a nitrate vulnerable zone for eutrophic water (2017). In both of these nitrate vulnerable zones, statutory land management measures apply limiting the average amount of nitrogen from manufactured fertiliser and organic manures that can be applied to agricultural land in order to reduce nitrogen losses from agricultural sources to the natural water environment.

4.3.31 Some agricultural land within the study area 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 (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.

- 4.3.32 Most Environmental Stewardship agreements, which were extensive and covered approximately 70% of agricultural land in England, have now ended although existing agreements will run their course. The higher tier and mid-tier options in the CSS are more focussed than Environmental Stewardship, with applications for funding being competitive and the area covered by the scheme less than that covered under Environmental Stewardship. However, four new simpler non-competitive offers have been introduced in 2018 to complement the higher tier and mid-tier options and open up the scheme to more farmers and land managers. Holdings that have land entered into an agri-environment scheme are identified in Table 8.

Number, type and size of holdings

- 4.3.33 Table 8 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.
- 4.3.34 Table 8 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 8: Summary of characteristics of holdings

Holding name	Holding type	Holding size (ha)	Diversification	Agri-environment scheme	Sensitivity to change
Moss House Farm	Beef and cattle	47	Contract shepherding	None	Medium
Millington House	Horticulture	2.6	None	None	High
Land at Ivy House Farm	Equestrian grazing	7	Unknown	None	Medium
Tatton Estate (Arden Enterprises)	Arable and livestock grazing	300	Detail not provided	ELS	Medium
Newhall Farm	Beef cattle	85	None	None	Medium

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Holding name	Holding type	Holding size (ha)	Diversification	Agri-environment scheme	Sensitivity to change
Tatton Estate (Marsh Partnership)	Arable and livestock grazing	300	Detail not provided	ELS	Medium
Tatton (Bowden View)	Equestrian grazing	7	Detail not provided	None	Medium
Briddon View Farm	Sheep	32	Detail not provided	None	Medium
Birkin Farm	Equestrian grazing	8	Detail not provided	None	Medium
Sugar Brook Farm	Arable and sheep	50	B+B and farmshop	HLS	Medium
Lower House Farm	Arable and grazing	14	Unknown	None	Low
Kell House Farm	Arable and grazing	300	Agricultural contracting	None	Medium
Back Lane Farm	Dairy	89	Livery, caravan storage, building lets	None	High
Land at Back Lane*	Livestock grazing	1	Unknown	None	Medium
Land at Little Thorns Green Farm*	Livestock grazing	3.5	Unknown	None	Medium
Higher Thorns Green Farm	Beef cattle and equestrian	44	Care farm	HLS and ELS	Medium
Land at Thorns Green*	Livestock grazing	2	Unknown	None	Medium
Land at Halebank Farm*	Livestock grazing	21	Unknown	None	Medium
Land at Warburton Green*	Livestock grazing	4	Unknown	None	Low
Land at Hale Barns	Forage grassland	4	None	None	Low
Land south of Wilmslow Road*	Livestock grazing	8	Unknown	None	Medium
Land at Flaxhigh Covert*	Livestock grazing	25	Unknown	None	Medium
Land at Davenport Green (S)*	Livestock grazing	12	Unknown	None	Medium

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Holding name	Holding type	Holding size (ha)	Diversification	Agri-environment scheme	Sensitivity to change
Land at Davenport Green (N)*	Livestock grazing	26	Unknown	None	Low

* 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)³⁶ 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);

³⁶ Supporting document: Draft Code of Construction Practice

- the protection and maintenance of existing land drainage and livestock water supply systems, where reasonably practicable (Sections 6 and 16);
- the protection of agricultural land adjacent to the construction site, including the provision and maintenance of appropriate stock-proof fencing (Sections 5, 6, 9 and 12);
- the adoption of measures to control the deposition of dust on adjacent agricultural crops (Section 7);
- the control of invasive and non-native species; and the prevention of the spread of weeds generally from the construction site to adjacent agricultural land (Section 9);
- the adoption of measures to prevent, insofar as reasonably practicable, the spread of soil-borne, tree, crop and animal diseases from the construction area (Sections 6 and 9); and
- liaison and advisory arrangements with affected landowners, occupiers and agents, as appropriate (Sections 5 and 6).

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

- agricultural crossing incorporated into Millington Footpath 7/2 accommodation overbridge to mitigate severance for Newhall Farm (CT-06-352); and
- agricultural crossing provided at Back Lane accommodation overbridge to mitigate severance at Back Lane Farm (CT-06-355).

4.4.4 The effect of severance of agricultural land for various holdings is also reduced by the ability of agricultural machinery to pass under Agden Brook viaduct, Blackburn's Brook viaduct, and River Bollin East viaduct at Hale Bank.

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

4.4.6 Upon completion of construction, it is currently anticipated that soils replaced for agricultural, forestry or landscape uses would be monitored to identify any unsatisfactory growing conditions during the five-year aftercare period. 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 association) may also require particularly careful management, such as the timing of cultivation and livestock grazing, during the aftercare period to ensure this outcome.

Assessment of impacts and effects

- 4.4.7 The acquisition and use of land for the Proposed Scheme would interfere with existing uses of that land and, in some locations, preclude existing land uses or sever and fragment individual fields and operational units of agricultural and forestry land. This could result in potential effects associated with the ability of affected agricultural and forestry interests to access and effectively use residual parcels of land. There may also be the loss of, or disruption to, buildings and operational infrastructure such as drainage. The Proposed Scheme seeks to reduce this disruption and, where appropriate and reasonably practicable, incorporate residual parcels of land no longer effective for agricultural use due to their size and/or shape as part of environmental mitigation works, such as ecological habitat creation.
- 4.4.8 Land used to construct the Proposed Scheme would fall into the following main categories when work is complete:
- part of the operational railway or associated infrastructure and kept under the control of the operator;
 - returned to agricultural use (with aftercare management to ensure stabilisation of the soil structure);
 - used for drainage or replacement floodplain storage areas, which may also retain some agricultural use; or
 - used for ecological and/or landscape mitigation.

Temporary effects during construction

Impacts on agricultural land

- 4.4.9 Interpretation of available data shows that the Proposed Scheme is likely to temporarily require approximately 189ha of agricultural land within the Hulseheath to Manchester Airport area during the construction phase, of which approximately 76ha (40%) are likely to be classified as BMV land (Grades 1, 2 and 3a). This is a medium magnitude of impact on BMV land.
- 4.4.10 As BMV land in this local area is a receptor of medium sensitivity, it is currently anticipated that the likely temporary effect of the Proposed Scheme on BMV land during the construction phase will be moderate adverse, which is significant.
- 4.4.11 Following completion of construction, temporary facilities would be removed and the topsoil and subsoil reinstated in accordance with the agreed end use for the land. Some permanently displaced soils may be used to restore land to agriculture or other uses with slightly deeper topsoil and subsoil layers, where appropriate.

Nature of the soil to be disturbed

- 4.4.12 The sensitivity of the soils disturbed by construction activity reflects their textural characteristics, in the light of local FCDs, as set out in the SMR.

In areas with the highest number of FCDs, and during the wettest times of the year, soils with high clay and silt fractions are most susceptible to the effects of handling during construction and the re-instatement of land; whereas soils with a high sand fraction in areas with the fewest number of FCDs and during the driest times of the year are the least susceptible.

- 4.4.13 Successful soil handling is dependent upon movements being undertaken under appropriate weather and ground conditions using the appropriate equipment. The principles of soil handling are well established and set out in advisory material such as Defra's Code of Practice for the Sustainable Use of Soils³⁷. These principles would be followed throughout the construction period.
- 4.4.14 Clayey and seasonally waterlogged soils (including soils in the Salop 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.
- 4.4.15 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 9 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.

³⁷ Defra (2009), *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites*

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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 9: Summary of temporary effects on holdings from construction

Holding name/ sensitivity to change	Land potentially required	Potential severance impact	Potential scale of effect
Moss House Farm Medium sensitivity to change	High	High	Major/moderate adverse
Millington House Medium ³⁸ sensitivity to change	High	Negligible	Major/moderate adverse
Land at Ivy House Farm Medium sensitivity to change	Medium	Negligible	Moderate adverse
Tatton Estate (Arden Enterprises) Medium sensitivity to change	Low	Medium	Moderate adverse
Newhall Farm Medium sensitivity to change	High	Low	Major/moderate adverse
Tatton Estate (Marsh Partnership) Medium sensitivity to change	Medium	Medium	Moderate adverse
Tatton (Bowden View) Medium sensitivity to change	High	Negligible	Major/moderate adverse
Briddon View Farm Medium sensitivity to change	High	Negligible	Major/moderate adverse
Birkin Farm Medium sensitivity to change	High	Negligible	Major/moderate adverse
Sugar Brook Farm Medium sensitivity to change	High	Negligible	Major/moderate adverse
Lower House Farm Low sensitivity to change	Negligible	Negligible	Negligible

³⁸ Sensitivity downgraded as glasshouses not affected

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Holding name/ sensitivity to change	Land potentially required	Potential severance impact	Potential scale of effect
Kell House Farm Medium sensitivity to change	Negligible	Negligible	Negligible
Back Lane Farm High sensitivity to change	Medium	Low	Major/moderate adverse
Land at Back Lane Medium sensitivity to change	High	Negligible	Major/moderate adverse
Land at Little Thorns Green Farm Medium sensitivity to change	Medium	Negligible	Moderate adverse
Higher Thorns Green Farm Medium sensitivity to change	High	Medium	Major/moderate adverse
Land at Thorns Green Medium sensitivity to change	High	Negligible	Major/moderate adverse
Land at Halebank Farm Medium sensitivity to change	High	Medium	Major/moderate adverse
Land at Warburton Green Low sensitivity to change	High	Negligible	Moderate adverse
Land at Hale Barns Low sensitivity to change	High	Negligible	Moderate adverse
Land south of Wilmslow Road Medium sensitivity to change	High	Negligible	Major/moderate adverse
Land at Flaxhigh Covert Medium sensitivity to change	High	Negligible	Major/moderate adverse
Land at Davenport Green (S) Medium sensitivity to change	High	Negligible	Major/moderate adverse
Land at Davenport Green (N) Low sensitivity to change	High	Negligible	Moderate adverse

4.4.20 Overall, the construction of the Proposed Scheme could potentially affect 24 holdings in the Hulseheath to Manchester Airport area temporarily. On the basis of information currently available 22 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 would be available under existing statutory arrangements to offset these impacts, it is not a consideration in the assessment of effects on farm holdings.

Permanent effects of construction

Impacts on agricultural land

- 4.4.22 Interpretation of publicly available data shows that the Proposed Scheme is likely to permanently require approximately 100ha of agricultural land within the Hulseheath to Manchester Airport area, of which approximately 40ha (40%) are likely to be classified as BMV land (Grades 1, 2 and 3a). This is a medium magnitude of impact on BMV land.

- 4.4.23 As BMV land in this local area is a receptor of medium sensitivity, it is currently anticipated that the likely effect of 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 10 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 10: 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
Moss House Farm Medium sensitivity to change	High	High	High	Major/moderate adverse
Millington House Medium sensitivity to change	High	Negligible	Low	Major/moderate adverse
Land at Ivy House Farm*	Medium	Negligible	Low	Moderate adverse

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Medium sensitivity to change				
Tatton Estate (Arden Enterprises) Medium sensitivity to change	Negligible	Medium	Low	Moderate adverse
Newhall Farm Medium sensitivity to change	Low	Low	Low	Minor adverse
Tatton Estate (Marsh Partnership) Medium sensitivity to change	Low	Medium	Low	Moderate adverse
Tatton (Bowden View) Medium sensitivity to change	High	Negligible	High	Major/moderate adverse
Briddon View Farm Medium sensitivity to change	High	Medium	Low	Major/moderate adverse
Birkin Farm Medium sensitivity to change	High	Low	Low	Major/moderate adverse
Sugar Brook Farm Medium sensitivity to change	Medium	Negligible	Low	Moderate adverse
Lower House Farm Low sensitivity to change	Negligible	Negligible	Negligible	Negligible
Kell House Farm Medium sensitivity to change	Negligible	Negligible	Negligible	Negligible
Back Lane Farm High sensitivity to change	Low	Low	Low	Moderate adverse
Land at Back Lane* Medium sensitivity to change	High	Negligible	Low	Major/moderate
Land at Little Thorns Green Farm* Medium sensitivity to change	Medium	Negligible	Low	Moderate adverse
Higher Thorns Green Farm Medium sensitivity to change	Medium	Medium	High	Major/moderate adverse
Land at Thorns Green* Medium sensitivity to change	High	Negligible	Low	Major/moderate adverse

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Medium sensitivity to change				
Land at Halebank Farm* Medium sensitivity to change	High	Medium	High	Major/moderate adverse
Land at Warburton Green* Low sensitivity to change	High	Negligible	Negligible	Moderate adverse
Land at Hale Barns Low sensitivity to change	High	Negligible	Negligible	Moderate adverse
Land south of Wilmslow Road* Medium sensitivity to change	High	Negligible	Negligible	Major/moderate adverse
Land at Flaxhigh Covert* Medium sensitivity to change	High	Negligible	Negligible	Major/moderate adverse
Land at Davenport Green (S)* Medium sensitivity to change	High	Negligible	Negligible	Major/moderate adverse
Land at Davenport Green (N)* Low sensitivity to change	High	Negligible	Negligible	Moderate adverse

* 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.

4.4.27 Overall, the construction of the Proposed Scheme could potentially affect 24 holdings in the Hulseheath to Manchester Airport area permanently. On the basis of information currently available, 21 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 four holdings (Moss House Farm, Bowden View Farm, Higher Thorns Green Farm and Halebank 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 is not yet known in the Hulseheath to Manchester Airport area, current indications are that the temporary effect on BMV agricultural land would be moderate adverse during construction, which would be significant. The permanent effect on BMV agricultural land would be moderate adverse during construction, which is significant.
- 4.4.33 Twenty-two farm holdings identified are anticipated to experience moderate or major/moderate temporary effects during construction, which would be significant for each holding. Twenty-one holdings are anticipated to experience moderate or major/moderate permanent effects of construction, which would be significant for each holding.
- 4.4.34 Effects on forestry land and soils to be disturbed will be reported in the formal ES.

4.5 Effects arising from operation

Avoidance and mitigation measures

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

Assessment of impacts and effects

- 4.5.2 Potential impacts arising from the operation of the Proposed Scheme would include:
- noise emanating from moving trains; and
 - the propensity of operational land to harbour noxious weeds.
- 4.5.3 Three sets of farm buildings at Moss House Farm, Millington House and Halebank 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 Hulseheath to Manchester Airport area.

5 Air quality

5.1 Introduction

- 5.1.1 This section of the report provides an assessment of the impacts and likely significant effects on air quality identified to date arising from the construction and operation of the Proposed Scheme within the Hulseheath to Manchester Airport area. Oxides of nitrogen (NO_x) including nitrogen dioxide (NO₂), fine particulate matter³⁹ (PM₁₀, PM_{2.5}) and dust have been considered in the assessment. Emissions of all or some of these air pollutants are likely to arise from construction activities, demolition, site preparation works and the use of site haul routes. Emissions would also arise from road traffic during construction and operation of the Proposed Scheme.
- 5.1.2 Engagement with Cheshire East Council (CEC), Manchester City Council (MCC) 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: MAo6 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)⁴⁰.
- 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 occur⁴¹:
- from construction;
 - from changes in the nature of traffic during construction and operation; for example, increases in traffic flows during construction or where road closures or restrictions cause diversions and heavier traffic on adjacent roads;
 - where road alignments have changed; or
 - from the operation of combustion plant at buildings.
- 5.2.3 The assessment of construction traffic will be reported in the formal ES. The assessment will incorporate HS2 Ltd's policies on vehicle emissions. These

³⁹ PM_{2.5} and PM₁₀ describe two size fractions of airborne particles that can be inhaled and therefore are of concern for human health. The designations refer to particles of size less than 2.5 and 10 microns in diameter.

⁴⁰ Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

⁴¹ 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.

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.

- 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 Hulseheath to Manchester Airport area are emissions from road vehicles, agricultural activities and Manchester Airport. The main roads within the area are: the M56, which extends across this area from the west to the east; the north section of the A556, which connects from the south (M6) to the north (M56); and the A538 Hale Road that connect to the M56 at junction 6.
- 5.3.2 There are no industrial installations (regulated by the Environment Agency) with permits for emissions to air in the Hulseheath to Manchester Airport area. The contribution of all industrial processes and other emission sources to local air quality is included within the background concentrations.
- 5.3.3 Estimates of background air quality have been obtained from Defra⁴² for the baseline year of 2017. These data are estimated for 1km grid squares for NO_x, NO₂, PM₁₀ and PM_{2.5}. Background concentrations are within the air quality standards for all pollutants within the Hulseheath to Manchester Airport area.

Local monitoring data

- 5.3.4 There are currently nine local authority diffusion tube sites located within the Hulseheath to Manchester Airport area for monitoring NO₂ concentrations. These are located along the main roads in the area. Measured concentrations in 2016 were within the air quality standard⁴³, with the exception of a site along the B556g Chester Road.
- 5.3.5 There are also 10 diffusion tube sites managed by Manchester Airport within the area. Measured concentrations in 2016 were above the air quality standard at five of these locations. However, these are all located within the airport and are not representative of locations with relevant exposure.

⁴² 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>

⁴³ 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 (AQMA) within the Hulseheath to Manchester Airport area, both designated for exceedances in the annual mean NO₂ standard. The first is the Greater Manchester Combined Authority AQMA, which extends over areas of the M56, the A56, the A538 and the A560 and was declared in 2001 and revised in May 2016. The second is The Chester Road AQMA, which covers an area between the A56 Lymm Road roundabout and junction 19 of the M6, and was declared in April 2008. In 2017 the A56 Knutsford to Bowdon Improvement opened between junction 19 of the M6 and junction 8 of the M56 in Mere, Cheshire. CEC expects to continue monitoring in this area to assess air quality along the old and new routes and inform future decisions about the AQMA.

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 that may be affected by the Proposed Scheme are residential. Other receptors include Bucklow Manor care home and Sunnyside pre-school nursery.
- 5.3.9 There are four statutory designated ecological sites identified within the Hulseheath to Manchester Airport area, namely Midland Meres and Mosses Phase 1 Ramsar site, Rostherne Mere Ramsar site, Rostherne Mere SSSI and Cotteril Clough SSSI.
- 5.3.10 Other non-statutory sensitive ecological sites identified close to the Proposed Scheme include Rostherne Mere National Nature Reserve (NNR), Hancock's Bank Ancient Woodland Inventory Sites (AWIS) and local wildlife sites (LWS), Arden House Wood AWIS and LWS, Brickhill Wood AWIS and LWS, Sunbank Wood AWIS, Sunbank Wood and Ponds site of biological importance (SBI), Davenport Green Wood SBI and Ponds at Davenport Green SBI.
- 5.3.11 Further details of the ecological sites 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)⁴⁴ 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

⁴⁴ Supporting document: Draft Code of Construction Practice

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;
- 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 PM_{2.5} concentrations.

Construction dust effects

5.4.5 The risks of demolition of existing buildings, earthworks, construction of new structures and trackout⁴⁵ have been assessed for their effect on dust soiling, human health⁴⁶ and ecological sites. There are residential and ecological receptors located within the Hulseheath to Manchester Airport area.

⁴⁵ 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

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

- 5.4.6 For demolition, the risk of dust effects would range from negligible to high and the risk of human health effects from negligible to medium, depending on the location of sensitive receptors and the magnitude of the activities. For earthworks, the risk of dust effects would range from low to high within this area, depending on the location of sensitive receptors and the magnitude of the 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 medium, depending on the location of sensitive receptors and the magnitude of the construction activities. There would also be a negligible to low risk of human health effects from construction. For trackout, the risk of dust effects would range from negligible to high, 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 trackout.
- 5.4.7 The risk of ecological effects would range from low to high within this area from all dust generating activities, depending on the location of sensitive receptors and the magnitude of the construction activities.
- 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 in traffic patterns from temporary road diversions and realignments.
- 5.4.10 The M56, the A538 Hale Road, the B5569 Chester Road, Ashley Road, Birkinheath Lane, Brickhill Lane, Castle Mill Lane, Cherry Tree Lane, Chapel Lane, Dirty Lane, Hasty Lane, Mill Lane, Mobberley Road, Rostherne Lane, Sunbank Lane, Runger Lane, Thorley Lane and the A538 Wilmslow Road 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 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 speed of road traffic and changes in road alignment and emissions from the operation of combustion plant in buildings.
- 5.5.3 There would be no direct atmospheric emissions from the operation of trains that would cause an impact on air quality and, therefore, no assessment is required. Indirect emissions from sources such as rail wear and brakes have been assumed to be negligible.

Operational traffic effects

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

Combustion plant emissions

- 5.5.5 Emissions from any stationary sources, such as combustion plant, will be included in the air quality assessment. Concentrations of NO₂ will be predicted at sensitive receptors and any effects will be reported in the formal ES.

Other mitigation measures

- 5.5.6 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

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

Monitoring

- 5.5.8 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme.
- 5.5.9 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 Hulseheath to Manchester Airport area.
- 6.1.2 The assessment draws on information gathered from engagement with the users and operators of community facilities including Cliffemount Community Care Home and the Children’s Adventure Farm Trust. 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: MAo6 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 Methodology Report (SMR)⁴⁷.
- 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

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

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.

- 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 2.2 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 Hulseheath to Manchester Airport area would be approximately 12km in length within the local authority areas of Cheshire East Council (CEC), Trafford Metropolitan Borough Council (TMBC) and Manchester City Council (MCC). The route of the Proposed Scheme would extend from Hulseheath in the west, passing close to the settlements of Booth Bank, Ashley, Thorns Green, Halebank, Warburton Green, Hale Barns, and Davenport Green in the east. Manchester Airport is located to the south of Halebank, and to the south of the route of the Proposed Scheme.
- 6.3.2 The Hulseheath to Manchester Airport area is predominantly rural, characterised by small clusters of dwellings and individual farms, with few community facilities. The outskirts of Altrincham are located towards the north of the area. In general, most community facilities lie within the area of Hale

Barns and Hale to the north and west of the M56, and within the village centres south of the M56.

Hulseheath, Rostherne and surrounds

- 6.3.3 This area covers the settlements of Hulseheath, Rostherne and surrounds, from the western boundary of the Hulseheath to Ashley Road (to the west of the village of Ashley).
- 6.3.4 The rural settlements of Millington and Rostherne are sparsely populated, comprising approximately 100 and 115 residential properties respectively. This area is characterised by areas of farmland interspersed with small settlements or individual residential properties, some of the latter would be on the route of the Proposed Scheme. There are a small number of community facilities within the area. The Children's Adventure Farm Trust at Booth Bank Farm, approximately 470m from the route of the Proposed Scheme, is an open farm providing activities and holiday respite accommodation for disabled and disadvantaged children. Bucklow Manor Nursing Home, located approximately 700m south of the route of the Proposed Scheme at the junction of Millington Lane and Chester Road, serves those with age-related care needs.
- 6.3.5 Rostherne Mere site of special scientific interest (SSSI) and National Nature Reserve is located in the centre of the area, 250m south of the route of the Proposed Scheme. The mere (a lake of approximately 80ha) and surrounding woodland are an important wildlife habitat. Rostherne Mere is not publicly accessible, although there is a public footpath and viewpoint to the west of the mere. Rostherne is situated to the south of the lake and community facilities include St Mary's Church of England church and Rostherne Cricket Ground.
- 6.3.6 Tatton Park is a large National Trust property located to the south of Rostherne. The estate has landscaped gardens and an extensive deer park, and is a regional attraction.
- 6.3.7 Promoted PRow in the area include the 282km Cheshire Cycleway (Regional Route 70, an on-road circular route from Chester, via Neston, Ellesmere Port, Comberbach, High Legh, Bucklow Hill, Ashley, around Macclesfield and Crewe, through Audlem, Shocklack before returning to Chester).

Ashley, Thorns Green, Halebank and surrounds

- 6.3.8 This area covers the settlements of Ashley, Thorns Green, Halebank and surrounds, from Ashley Road in the west to the M56 (to the north of Halebank) in the east.
- 6.3.9 The village of Ashley, which has approximately 70 residential properties, is located to the north of the route of the Proposed Scheme. The nearest residential properties would be approximately 50m from the route of the Proposed Scheme. Ashley has a range of community facilities including Sunnyside Pre-school Nursery and St Elizabeth's Church; and recreational facilities such as the Ashley Cricket Club and The Greyhound public house. The M56 runs to the north of Ashley.

- 6.3.10 The hamlet of Thorns Green, which is located west of Ashley, has approximately 20 residential properties some of which would be on the route of the Proposed Scheme. Higher Thorns Green Farm is a large farm and would also be on the route of the Proposed Scheme. The farm provides social and education farm experiences, including outreach projects for people with learning difficulties.
- 6.3.11 Halebank has approximately 20 residential properties, some of which would be located on the route of the Proposed Scheme. Sunbank Wood is a publicly accessible woodland area of approximately 13ha located to the south of Halebank. Halebank is connected via Sunbank Lane north over the M56 to Warburton Green.
- 6.3.12 Quarry Bank Mill, a regional attraction, is a large National Trust industrial property and estate located to the south-east of Halebank and Manchester Airport. Quarry Bank Mill includes several listed industrial buildings, landscaped gardens and woodland.
- 6.3.13 Promoted PRow in the area include the Cheshire Cycleway and Manchester Airport Orbital Cycleway (Regional Route 85, a traffic-free, 13km route around Manchester Airport) both are part of the National Cycle Network.

Warburton Green, Hale Barns, Davenport Green and surrounds

- 6.3.14 This area covers the settlements of Warburton Green, Hale Barns, Davenport Green and surrounds, from the M56 in the south to Davenport Green in the north.
- 6.3.15 Situated to the north of the M56, Hale Barns and Warburton Green lie on the south-west outskirts of Altrincham. The area is predominantly residential, with approximately 1,500 residential properties. Some residential properties would be on the route of the Proposed Scheme. The area includes several schools (such as Elmridge Primary School, St Ambrose Preparatory School, and St Ambrose College), and places of worship (including Holy Angels Catholic Church, Hale Chapel, All Saints Church and Hale Synagogue). There is also a health centre, care homes (Cliffemount Community Care Home) and recreational facilities such as Hale Golf Club, Ringway Golf Club, the Tennis Club and Hale Barns Cricket Club.

6.4 Effects arising during construction

Avoidance and mitigation measures

- 6.4.1 The draft Code of Construction Practice (CoCP)⁴⁸ includes a range of provisions that will help mitigate community effects associated with construction within this area, including:
- implementation of a community engagement framework to provide appropriate information and resolve community issues (Section 5 of the draft CoCP);

⁴⁸ Supporting document: Draft Code of Construction Practice

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

Assessment of impacts and effects

Temporary effects

Residential properties

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

Community facilities

- 6.4.3 Construction of the Millington Lane realignment would temporarily require land currently used as a car park servicing the Children's Adventure Farm Trust (CAFT) at Booth Bank Farm on Reddy Lane, Millington. The land would be required for approximately two years. CAFT provides a variety of activity programmes and holiday respite accommodation for terminally ill, disabled and disadvantaged children. All of the car park would be required. The loss of the car park may affect access to CAFT, but is unlikely to affect the ability of the resource to function. However, in the absence of confirmed mitigation, the loss of land at Booth Bank Farm, affecting CAFT, would result in a moderate adverse effect, which would be significant.

Recreational facilities

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

Open space and PRoW

- 6.4.5 No temporary effects on open space and PRoW have been identified as a result of the land required for construction of the Proposed Scheme.

Permanent effects

Residential properties

- 6.4.6 Construction of the Thorns Green cutting would require the demolition of five properties on Castle Mill Lane at Thorns Green. Permanent loss of these properties would result in a moderate adverse effect, which would be significant.
- 6.4.7 Construction of the Warburton Green cutting would require demolition of five properties on Sunbank Lane, Hale Bank. Permanent loss of these properties would result in a moderate adverse effect, which would be significant.
- 6.4.8 Construction of the Manchester Airport High Speed Station cutting would require the demolition of seven properties on Hasty Lane and Hale Road. Permanent loss of these properties would result in a moderate adverse effect, which would be significant.
- 6.4.9 Land required for the Rostherne cutting would result in the demolition of three individual residential properties on Yarwoodheath Lane. These residential properties would be permanently lost.

Community facilities

- 6.4.10 Construction of Thorns Green cutting, Castle Mill Lane realignment and Castle Mill Lane overbridge would require the demolition of Higher Thorns Green Farm. The Farm (which also has a residential property on the site) makes use of a working farm environment to provide social and educational opportunities based around animal husbandry and the growing and cooking of food. The farm also hosts the Fairfield Farm Project, which is run by Fairfield Care. The project provides farm-based activities as part of an outreach programme for children and adults receiving care, supported by qualified care staff. The project specialises in assisting young people with autism conditions and learning disabilities.
- 6.4.11 There are limited other resources that provide a similar service – the Children’s Adventure Farm Trust at Booth Bank Farm is located approximately 8km away, however, Higher Thorns Green Farm provides a different variety of support, particularly for vulnerable people within the community. Therefore, the permanent loss of the services it provides would result in a major adverse effect, which would be significant.
- 6.4.12 Construction of the Manchester Airport High Speed Station cutting would require the demolition of Cliffemount Community Care Home on Hale Road. The privately-owned service is registered to provide on-site accommodation for up to five people requiring complex care, with a stated specialism supporting younger adults with learning disabilities and those diagnosed to be on the autistic spectrum. The demolition of Cliffemount Community Care Home would require existing residents to be relocated to suitable alternative accommodation. Therefore, the permanent loss of the care service would result in a major adverse effect, which would be significant.

Recreational facilities

- 6.4.13 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

- 6.4.14 Construction of Ashley embankment, Ashley Road realignment and Lamb Lane realignment would permanently require approximately 115m of the Cheshire Cycleway to the south-west of Ashley, severing this PRow. Proposed mitigation and an assessment of the likely effects will be reported in the formal ES.

Other mitigation measures

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

Summary of likely residual significant effects

- 6.4.17 Land required for construction of the Proposed Scheme is likely to result in temporary residual significant effects on the Children's Adventure Farm Trust at Booth Bank Farm in Millington.
- 6.4.18 Land required for the construction of the Proposed Scheme is likely to result in the following permanent residual significant adverse effects:
- loss of residential properties on Castle Mill Lane in Thorns Green;
 - loss of residential properties on Sunbank Lane in Hale Bank;
 - loss of residential properties on Hasty Lane and Hale Road in Hale Barns;
 - demolition of working farm facility at Higher Thorns Green Farm on Castle Mill Lane in Thorns Green; and
 - demolition of Cliffemount Community Care Home on Hale Road in Hale Barns.

Cumulative effects

- 6.4.19 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.
- 6.4.20 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 Hulseheath to Manchester Airport area as a consequence of the construction and operation of the Proposed Scheme. This includes effects on sites recognised or designated on the basis of their importance for nature conservation.
- 7.1.2 Engagement with stakeholders including Natural England, Environment Agency, the Woodland Trust, Forestry Commission, 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: MAo6 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)⁴⁹.
- 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.

⁴⁹ Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

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.
- 7.3.2 The land required for the Proposed Scheme in the Hulseheath to Manchester Airport area consists mainly of agricultural land and farmsteads. The topography of the land along the route of the Proposed Scheme is predominately flat, but watercourses such as Agden Brook near Millington Hall and the River Bollin near Halebank, are within steep valleys. The Proposed Scheme would follow the route of the M56 between Booth Bank and Halebank, where it crosses the motorway at Halebank, towards Davenport Green.

Designated sites

- 7.3.3 There are two internationally important sites of potential relevance to the assessment in the Hulseheath to Manchester Airport area. They are:
- Midland Meres and Mosses Phase 1 Ramsar site, covering an area of 510.9ha, comprises 16 geographically discrete areas across the Cheshire Plain. This site is designated for its diverse range of habitats from open water to raised bog and because it supports a number of rare plants associated with wetlands including five nationally scarce species together with an assemblage of rare wetland invertebrates. One component site of special scientific interest (SSSI) of the Midland Meres and Mosses Phase 1 Ramsar site is of potential relevance to the assessment in the Hulseheath to Manchester Airport area. This is Tatton Meres SSSI which is situated to the north of Knutsford, 3.2km south of the land required for the Proposed Scheme. This Ramsar site is also relevant to the Pickmere to Agden and Hulseheath area (MA03), where Tatton Meres SSSI and another component site, The Mere, Mere SSSI are respectively 3km and 1.4km east of the land required for the Proposed Scheme; and
 - Rostherne Mere Ramsar site covering an area of 79.8ha is designated because it is one of the deepest and largest of the meres of the Shropshire-Cheshire Plain. It is also designated as Rostherne Mere SSSI and National Nature Reserve (NNR). Marginal vegetation consists of a narrow fringe of common reed. Populations of cormorant, bittern and water rail are of national importance. The site is located west of Rostherne, 80m south of the land required for the Proposed Scheme within the Hulseheath to Manchester Airport area. This Ramsar site is also relevant to the Pickmere to Agden and Hulseheath area (MA03), where it is, 1.2km east of the land required for the Proposed Scheme.

7.3.4 There are two nationally important SSSIs of potential relevance to the assessment in the Hulseheath to Manchester Airport area. For each of these sites the Proposed Scheme in this area is within the Impact Risk Zone⁵⁰ relevant to railway infrastructure as identified by Natural England. They are:

- Rostherne Mere SSSI and NNR covering an area of 152.9ha, is designated for its nutrient rich open water body with fringing reed swamp. The area of the Rostherne Mere SSSI extends beyond the boundary of the Ramsar site and includes additional grassland habitats. It acts as a winter roost for large numbers of ducks and holds nationally significant numbers of pochard and pintail. The site's designation as an NNR is for woodland and wetland birds, mammals, butterflies and its importance for freshwater research. The site is located adjacent to the land required for the Proposed Scheme between Hulseheath and Agden Lane. This SSSI/NNR is also relevant to Volume 2: MA03, Pickmere to Agden and Hulseheath, where it is located 1.2km east of the land required for the Proposed Scheme; and
- Cotteril Clough SSSI, covering an area of 10.3ha, comprises lowland broadleaved woodland with three distinct zones within the woodland on the upper slope, valley side and valley bottom. The upper slopes of the valley support oak, ash, sycamore and birch woodland with ground flora including dog's-mercury, wood anemone and bluebell. This then grades into ash and wych elm woodland. Along the bottom of the valley is wet alder woodland with abundant ramsons and less common plants including wood vetch, thin-spiked wood sedge and giant bellflower. It is also of interest for invertebrates and woodland birds. The SSSI is located 610m south of the land required for the Proposed Scheme.

7.3.5 Tatton Meres SSSI and The Mere, Mere SSSI as component sites of The Midland Meres and Mosses Phase 1 Ramsar site, are of relevance to this assessment, but the Proposed Scheme within the Hulseheath to Manchester Airport area is not within the Impact Risk Zone for these SSSIs.

7.3.6 There are 18 local wildlife sites (LWS) of potential relevance to the assessment in the Hulseheath to Manchester Airport 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 are:

- Cicely Mill Pool LWS, covering an area of 4.6ha, comprises a shallow, silty lake managed for sport fishing and wildlife conservation. The LWS is located at Cicely Mill, 1.4km south of land required for the Proposed

⁵⁰The 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.

Scheme and is also relevant to the Pickmere to Agden and Hulseheath area (MA03);

- Yarwood Heath Covert LWS, covering an area of 2.8ha, comprises woodland. The LWS is located 90m north-west of land required for the Proposed Scheme and 110m south of a construction haul route, between Junctions 7 and 8 of the M56;
- Hancock's Bank South LWS, covering an area of 5.8ha, comprises woodland habitat along Blackburn's Brook, which includes areas of ancient semi-natural woodland. The LWS is partially within the land required for the Proposed Scheme, west of Birkin House;
- Hancock's Bank North LWS, covering an area of 5.8ha, comprises woodland and is located along Blackburn's Brook and includes areas of ancient semi-natural woodland. The LWS is located 110m north of land required for the Proposed Scheme, adjacent to the M56, east of junction 7 at Ryecroft Farm;
- Twiss's Wood LWS, covering an area of 7.5ha, comprises woodland. The LWS is located 740m south of land required for the Proposed Scheme, north of Ashley Road and east of Rostherne;
- Ryecroft Covert LWS, covering an area of 4.2ha, comprises woodland and scrub habitat adjacent to both carriageways of the M56. The LWS is partially within the land required for the Proposed Scheme, either side of the M56, east of junction 7 at Ryecroft Farm;
- Old Deer Enclosure, Tatton Park LWS, covering an area of 87ha, comprises river habitats along Tatton Mere Brook, grassland habitats and small parcels of woodland. The site is used extensively by a managed population (400 breeding head) of red and fallow deer, which roam freely in over 1,000 acres of parkland. The LWS is located 830m south of land required for the Proposed Scheme, within the National Trust's Tatton Park estate north of Knutsford;
- Mill Pool and Long Hey Meadow LWS, covering an area of 11.1ha, comprises meadow habitats and ponds. The LWS is located 1.7km south of land required for the Proposed Scheme, within the National Trust's Tatton Park estate north of Knutsford;
- Birkenheath Covert LWS, covering an area of 3.6ha, comprises woodland. The LWS is located 350m south of land required for the Proposed Scheme and adjacent to a construction access route along Birkenheath Lane and Ashley Road;
- Ashley Mill Wood LWS, covering an area of 0.5ha, comprises woodland. The LWS is located 1.3km north of land required for the Proposed Scheme, north of Ashley Mill Lane along the River Bollin and west of Coppice Farm;

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- Wood near Arden House LWS, covering an area of 3ha, comprises woodland habitat and areas of ancient semi-natural woodland. The LWS is located partially within the land required for the Proposed Scheme, east of Mobberley Road and north of Arden House;
- Erlam's Meadow LWS, covering an area of 2.4ha, comprises meadow and scrub habitats. The LWS is partially within the land required for the Proposed Scheme, south of Ashley;
- Jackson's Bank West LWS, covering an area of 5.5ha, comprises woodland. The LWS is located 830m north of the land required for the Proposed Scheme, south of Ashley Road along the River Bollin and west of Hale Golf Club;
- Ecclesfield Wood LWS, covering an area of 3ha, comprises a parcel of woodland. The LWS is partially within the land required for the Proposed Scheme, north of Lower House Farm;
- Jackson's Bank East LWS, covering an area of 2ha, comprises woodland. The LWS is located 335m north of land required for the Proposed Scheme, either side of the M56 and north of Castle Mill Lane;
- Brickhill Wood LWS, covering an area of 4ha, comprises woodland habitat and includes areas of ancient semi-natural woodland. The LWS is partially within the land required for the Proposed Scheme, south of Thorns Green;
- Mill Wood - Castle Mill LWS, covering an area of 1.8ha, comprises woodland. The LWS is located 230m south of land required for the Proposed Scheme and adjacent to a proposed construction access route along Mill Lane, west of Castle Hill; and
- Bollin Oxbow at Castle Hill LWS, covering an area of 6.2ha, comprises scrub and river habitat along the River Bollin. The LWS is located 670m south of land required for the Proposed Scheme and adjacent to a proposed construction access route along Mill Lane, west of Castle Hill.

7.3.7

There are 13 sites of biological importance (SBI) of potential relevance to the assessment in the Hulseheath to Manchester Airport area, each of which is of county/metropolitan value. Details of site interest features and reasons for designation will be updated in the formal ES. The SBI are:

- M56/A556 Cloverleaf SBI, covering an area of 1.9ha, comprises woodland and grassland habitat. The SBI is located 15m north of land required for the Proposed Scheme, within Junction 8 of the M56;
- Watch Hill SBI, covering an area of 5.3ha, comprises woodland along the River Bollin. The SBI is located 250m north-east of a proposed construction access route at the A56, A556 and M56 roundabout and 830m north-east of land required for the Proposed Scheme, at Watlingford;

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- Fish House Plantation SBI, covering an area of 3.3ha, comprises an area of plantation woodland. The SBI is located 670m north of land required for the Proposed Scheme, at Ryecroft Covert;
- Bentley and Tomfield Banks SBI, covering an area of 8.6ha, comprises woodland habitat and areas of ancient semi-natural woodland. The SBI is located 685m north of land required for the Proposed Scheme, north of Hale Golf Club;
- Rossmill SBI, covering an area of 5.4ha, comprises woodland habitat and ancient semi-natural woodland. The SBI is located 70m north of land required for the Proposed Scheme, south of Carrwood Road along the River Bollin;
- Wood near Chapel Lane SBI, covering an area of 0.8ha, is designated for its woodland. The SBI is partially within the land required for the Proposed Scheme, west of Halebank;
- Sunbank Wood and Ponds SBI, covering an area of 23.7ha, comprises woodland habitat including areas of ancient semi-natural woodland and ponds that support a range of amphibian species. The SBI is partially within the land required for the Proposed Scheme, north of Castle Hill;
- Cotteril Clough SBI, covering an area of 11.2ha, comprises areas of ancient semi-natural woodland. The SBI is located 610m south of the land required for the Proposed Scheme at Castle Hill and adjacent to a proposed construction access route on A538 Wilmslow Road and Mill Lane. The majority of the SBI is also Cotteril Clough SSSI as described above;
- Well and Double Woods SBI, covering an area of 5.3ha, comprises woodland habitat and areas of ancient semi-natural woodland. The SBI is located 670m south of land required for the Proposed Scheme and adjacent to a proposed construction access route on Mill Lane, west of Castle Hill;
- Road Cutting at Castle Hill SBI, covering an area of 0.6ha, comprises woodland and scrub habitat. The SBI is located 1km south-east of land required for the Proposed Scheme at Halebank Farm and adjacent to a proposed construction access route on Mill Lane;
- Ponds near Manchester Airport Runway SBI, covering an area of 4.1ha, comprises woodland and grassland and is designated for its water bodies. The SBI is located 995m south of land required for the Proposed Scheme, north of Manchester Airport;
- Ponds at Davenport Green SBI, covering an area of 34.2ha, comprises grassland pasture and pond habitats. The SBI is located 120m north-west of land required for the Proposed Scheme at Davenport Green; and

- Davenport Green Wood SBI, covering an area of 3.6ha, comprises ancient woodland and Timperley Brook. The woodland is partially within the land required for the Proposed Scheme, south of Davenport Green Hall.

7.3.8

There are 14 Ancient Woodland Inventory Sites (AWIS) relevant to the assessment in this area. Due to the habitats and species present, these sites are considered to be up to county/metropolitan value. Eleven of these AWIS are also LWS or SBI as described above. They are:

- Banks Wood AWIS, covering an area of 9ha, is located 865m south of land required for the Proposed Scheme, north of Cicely Mill Lane;
- Harpers Bank Wood AWIS, covering an area of 8.4ha, is located 420m north of land required for the Proposed Scheme, east of Rostherne Lane;
- Wood Bongs AWIS, covering an area of 3.5ha, is located 675m north of land required for the Proposed Scheme, north of Marsh Lane;
- Watch Hill AWIS, covering an area of 3.5ha, is located 250m north-east of a proposed construction access route at the A56, A556 and M56 roundabout and 830m north-east of land required for the Proposed Scheme, at Watlingford. The woodland is within an SBI as described above;
- Hancock's Bank AWIS, covering an area of 3.2ha, including 0.7ha of Planted Ancient Woodland Site (PAWS), is located partially within the land required for the Proposed Scheme, west of Birkin House. The woodland is within Hancock's Bank South LWS as described above;
- Birkin House AWIS, covering an area of 0.9ha of PAWS, is located 105m west of land required for the Proposed Scheme, south-west of Birkin House. The woodland is within Hancock's Bank South LWS as described above;
- Hancock's Bank North AWIS, covering an area of 1.4ha, is located 110m north of land required for the Proposed Scheme, adjacent to the M56, east of junction 7 at Ryecroft Farm. The woodland is within Hancock's Bank North LWS as described above;
- Arden House Wood AWIS, covering an area of 2.6ha of PAWS, is partially located within land required for the Proposed Scheme, east of Mobberley Road and north of Arden House. The woodland is within Wood near Arden House LWS as described above;
- Bentley/Tomfield Banks AWIS, covering an area of 4ha, is located 685m north of land required for the Proposed Scheme, north of Hale Golf Club. The woodland is within an SBI as described above;

- Warburton Wood AWIS, covering an area of 2.2ha, is located 70m north of land required for the Proposed Scheme, south of Carrwood Road along the River Bollin. The woodland is within Rossmill SBI as described above;
- Brickhill Wood AWIS, covering an area of 2.3ha of PAWS, is adjacent to land required for the Proposed Scheme, south of Thorns Green. The woodland is within Brickhill Wood LWS as described above;
- Sunbank Wood AWIS, covering an area of 12.4ha, is located adjacent to the land required for the Proposed Scheme, north of Castle Mill Farm. The woodland is within Sunbank Wood and Ponds SBI as described above;
- Cotteril Clough AWIS, covering an area of 11ha, is located 610m south of land required for the Proposed Scheme, at Castle Hill either side of the A538 Wilmslow Road. The woodland is within Cotteril Clough SBI as described above; and
- Davenport Green Wood, covering an area of 3.6ha, has been identified as ancient woodland by Natural England but has not yet been included on the AWI. The woodland is partially within the land required for the Proposed Scheme, south of Davenport Green Hall. The woodland is also Davenport Green Wood LWS as described above.

7.3.9 A review is being undertaken to identify any additional woodlands that are not currently listed in the AWI but that may nevertheless be ancient. These will be identified and addressed 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 In addition to the aforementioned woodland, there are eight areas of lowland deciduous woodland (likely to qualify as habitats of principal importance⁵¹, and local Biodiversity Action Plan (BAP)⁵² habitats), which are partly within the land required for the Proposed Scheme. These are situated to the east of Ivy House Farm, south of Booth Bank Farm, south of Lamb's Covert, near Birkin Farm, along the River Bollin and at the M56 junction 6. On a precautionary basis, pending the findings of field surveys, these woodlands are considered to be of up to county/metropolitan value.

Grassland

7.3.12 It is possible that grassland outside designated sites, which may qualify as a habitat of principal importance and local BAP habitat, occurs within the land

⁵¹ Section 41 of the Natural Environment and Rural Communities Act 2006

⁵² Cheshire Region Biodiversity Action Plan and Greater Manchester Biodiversity Action Plan

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 Hulseheath to Manchester Airport area are likely to qualify as a habitat of principal importance and a local BAP habitat. Some may also meet the wildlife and landscape criteria to be 'important' hedgerows as defined in the Hedgerows Regulations 1997⁵³. They include those along the A56, Birkin Brook and the River Bollin. In addition, hedgerow habitats could also provide commuting corridors for wildlife as well as nesting and feeding habitat. On a precautionary basis, pending the findings of field surveys, the hedgerow network is considered to be of up to district/borough value.

Watercourses

- 7.3.14 Millington Clough, Agden Brook, Blackburn's Brook, Birkin Brook, the River Bollin, Timperley Brook and several smaller watercourses would be crossed by the route of the Proposed Scheme. These may qualify as habitats of principal importance, or local BAP habitats. On a precautionary basis, pending the findings of field surveys, the larger watercourses are assumed to be of up to county/metropolitan value. The smaller watercourses are considered to be of up to district/borough value.

Water bodies

- 7.3.15 There are 37 ponds that would be located within or partly within, the land required for the Proposed Scheme, none of which are within land required 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 newts). On a precautionary basis, pending the findings of field surveys, ponds have been considered 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 provided in Table 11.

⁵³ Statutory Instrument 1997 No. 1160 'Hedgerows Regulations 1997

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Table 11: Species potentially relevant to the assessment within the Hulseheath to Manchester Airport area

Resource/feature	Value	Rationale
Bats	Up to regional	<p>There are records for soprano pipistrelle and noctule within land required for the Proposed Scheme in the vicinity of Mereside Farm. There is one record of a common pipistrelle roost within 200m of land required for the Proposed Scheme at Hale.</p> <p>Records within 2km of the Proposed Scheme include common pipistrelle, soprano pipistrelle, Brandt's bat, Daubenton's bat, Natterer's bat, whiskered bat, brown long-eared bat and noctule. They include roosts of unknown species (Bowden), pipistrelle (Montebello Castle), common pipistrelle (Bowdon, Mobberley, Trafford, Hale Barns, Hale, Mayfields, Davenport Green, Roundthorn), soprano pipistrelle (Bowden), whiskered bat (Hale Barns, south of Castle Hill Farm, Manchester Airport) and brown long-eared bat (Hale Barns, Hale).</p> <p>Records confirm that Nathusius' pipistrelle and serotine are in the wider Cheshire area and suitable habitat to support these species is present within the land required for the Proposed Scheme.</p> <p>Field surveys recorded the widespread presence of habitats considered suitable to support roosting, foraging and commuting bats, including hedgerows, woodlands and water bodies and watercourses.</p>
Otter	Up to county/metropolitan	<p>There are desk study records for otter on the River Bollin and the M56 crossing of the river, within the land required for the Proposed Scheme. Records also exist within Rostherne Mere less than 100m south of the land required for the Proposed Scheme.</p> <p>Suitable habitat is present, providing foraging, breeding and dispersal opportunities for otter along watercourses, drainage ditches and large water bodies within the Hulseheath to Manchester Airport area.</p> <p>Otter are widely distributed south of the urban areas around Manchester but appear to be present only in small numbers with a slow rate of colonisation in Cheshire⁵⁴.</p>
Water vole	Up to county/metropolitan	<p>There are strongholds for this species throughout Cheshire and water vole populations are widespread and locally common around Greater Manchester⁵⁵. Habitat suitable for water vole is potentially present along the watercourses and drainage ditches, and there are records of their presence along Agden Brook and Blackburn's Brook, and at Rostherne Mere, all within 80m of the land required for the Proposed Scheme.</p>
Polecat	Up to county/metropolitan	<p>Polecat is now widespread across Cheshire but range expansion is restricted, possibly as a result of conurbations present acting as a significant barrier⁵⁶. Habitat suitable for this species is present, including hedgerows, farmland and woodland. There is a single</p>

⁵⁴ Environment Agency (EA) (2010). Fifth otter survey of England 2009-2010:

http://www.thepredationactiongroup.co.uk/images/EA_otter_survey_oct10.pdf

⁵⁵ Water vole Species Action Plan 2009. http://www.gmbp.org.uk/site/images/stories/water%20voles%20bap_09.pdf

⁵⁶ Croose, E. (2016). The Distribution and Status of the Polecat (*Mustela putorius*) in Britain 2014-2015:

<https://www.vwt.org.uk/wp-content/uploads/2016/04/Polecat-Report-2016.pdf>

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Resource/feature	Value	Rationale
		record of their presence between Hale and Davenport Green and a record at Rostherne Mere ⁵⁷ .
Great crested newt	Up to county/metropolitan	<p>There are records of great crested newt within 250m of land required for the Proposed Scheme at locations including south of Ryecroft Farm, east of Mobberley Road, Sunbank Wood, south of the M56 junction 6 and south of Davenport Green Wood. There are also records of great crested newt less than 500m to the north of the land required for the Proposed Scheme near Roaring Gate Farm.</p> <p>Great crested newt is widespread throughout the Cheshire region, probably due to the relative abundance of farm ponds and suitable terrestrial habitat throughout the region⁵⁸.</p>
Birds	Up to county/metropolitan	<p>The meres, rivers, farmland, woodland and built environments of this area are suitable for breeding and wintering birds. Species associated with these habitats include spotted flycatcher, black redstart, willow tit, lapwing, barn owl, skylark, tree sparrow, yellow wagtail, linnet and yellowhammer, which breed in low numbers in farmland and woodland habitats, and the built environment.</p> <p>There are records of barn owl at Rostherne Mere, within 500m of land required for the Proposed Scheme.</p> <p>Wintering bird surveys carried out of wetland habitat recorded mallard, teal and wigeon.</p>
White clawed crayfish	Up to county/metropolitan	<p>There is a record of white clawed crayfish within 1.8km south of the Proposed Scheme in Tatton Mill Brook, Tatton. Distribution of white clawed crayfish in Cheshire is restricted⁵⁹; however, suitable habitat is likely to be present in watercourses including the Millington Clough, Agden Brook, Blackburn's Brook, Birkin Brook, River Bollin, Timperley Brook, smaller watercourses, and in water bodies.</p>
Aquatic invertebrates	Up to district/borough	<p>Suitable habitat for aquatic invertebrates is present throughout land required for the Proposed Scheme and includes ponds and ditches and along watercourses including Millington Clough, Agden Brook, Blackburn's Brook, Birkin Brook, River Bollin, Timperley Brook, smaller watercourses and associated floodplains. No notable records exist within the Hulseheath to Manchester Airport area. However, notable species could occur in potentially suitable habitat within land required for the Proposed Scheme.</p>
Terrestrial invertebrates	Up to district/borough	<p>Suitable habitat for terrestrial invertebrates is potentially present within the land required for the Proposed Scheme. No notable records exist within the Hulseheath to Manchester Airport area.</p> <p>Habitats associated with rare and notable invertebrate species in Cheshire include woodland, hedgerows, grassland and meadows. These habitats are present throughout land required for the</p>

⁵⁷ Natural England. (2018). Pers. comm. 24 May

⁵⁸ Cheshire Wildlife Trust. (2018). Great crested Newt - Local Biodiversity Action Plan: <https://www.cheshirewildlifetrust.org.uk/sites/default/files/2018-06/Great%20crested%20newt.pdf>

⁵⁹ White Clawed Crayfish Local Biodiversity Action Plan: <https://www.cheshirewildlifetrust.org.uk/sites/default/files/2018-06/White%20clawed%20crayfish.pdf>

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Resource/feature	Value	Rationale
		Proposed Schemes including at ancient woodland sites, Erlam's Meadow LWS and hedgerows surrounding fields.
Fish	Up to district/borough	There are records of European bullhead, brook lamprey, eel and brown trout in the rivers that would be affected by the Proposed Scheme. European bullhead and brook lamprey are listed under Annex II of the EC Directive on the conservation of natural habitats and flora and fauna but the former is widespread and common in the UK; brook lamprey, eel and brown trout populations are declining across the UK. These species are not found in badly polluted rivers.
Reptiles	Up to district/borough	Suitable habitat is likely to be present for reptiles, including around the watercourses, ponds and woodland edges. Consultees have confirmed that reptiles are sparsely distributed in Cheshire and Greater Manchester and strongholds are associated with remaining mossland areas.

7.4 Effects arising during construction

Avoidance and mitigation measures

7.4.1 The following measures have been included as part of the design of the Proposed Scheme (in addition to the landscape planting shown on the Map Series CT-o6 in the Volume 2: MAo6 Map Book, along the rail corridor which would be largely a mixture of woodland/scrub and grassland), and would contribute towards offsetting the losses of habitat and effects on species:

- construction of viaducts over Agden Brook, Blackburn's Brook, Birkin Brook and the River Bollin would reduce habitat loss associated with Hancock's Bank LWS, Hancock's Bank AWIS, Sunbank Wood and Ponds SBI and Wood near Chapel Lane SBI and allow free passage for wildlife beneath them, including along the rivers and their banks;
- provision of approximately 8.3ha of additional broadleaved woodland to contribute towards compensation for the losses of woodland, enhance remaining woodlands, and enhance connectivity between remaining woodlands, including woodland south of Ivy House Farm (3.3ha), north of Ivy House Farm (0.6ha), north of Birkinheath Covert (1.2ha) and south of Halebank Farm (3.2ha);
- provision of new ponds to replace those lost including those north of Arden House, south of Hough Green Farm, north of Middle Cottage and south of Burnside, Hale Barns;
- provision of new species-rich hedgerows, using appropriate native species, to help compensate for loss of hedgerows, and re-connect the ecological network in the surrounding areas, including along the margins of the Proposed Scheme, but also in specific areas such as Agden Brook to Chester Road and along Millington Lane, between Birkin Brook and Lamb Lane, between Ecclesfield Wood and Mill Lane, around Warburton Green, around Flaxhill Covert and along Thorley Lane;

- provision of new grassland habitats, including some species rich grasslands and meadow creation to contribute towards compensation for losses from the Proposed Scheme (e.g. around Blackburn's Brook and Birkin Brook, around Mobberley Road, near Ecclesfield Wood, around Halebank and around Flaxhill Covert); and
- river restoration and wetland habitat creation within floodplains would help towards compensation for the loss of aquatic habitat (e.g. along Blackburn's Brook, Birkin Brook and Timperley Brook).

7.4.2 The assessment assumes implementation of the measures set out within the draft Code of Construction Practice (CoCP)⁶⁰, which includes translocation of protected species where appropriate.

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

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

⁶⁰ Supporting document: Draft Code of Construction Practice

Designated sites

- 7.4.5 A study to inform the Habitats Regulations Screening Assessment was undertaken for the Midland Meres and Mosses Phase 1 Ramsar site⁶¹ during the Appraisal of Sustainability stage of the project development. This was undertaken in consultation with Natural England and the Environment Agency. It demonstrated that incorporating avoidance measures would avoid any impacts on the groundwater regime of The Mere, Mere SSSI. The findings concluded that with the appropriate avoidance measures in place, there would be no likely significant effect to the Ramsar site and Appropriate Assessment is not required. HS2 Ltd will continue to consult with these bodies (and other relevant key stakeholders) as the design develops to ensure that the submitted design in the hybrid Bill complies with the Habitats Regulations 2017. Where required, further assessment will be undertaken and an appropriate design will be developed through an iterative process. Any studies to inform the required assessments will be completed and the outcomes agreed with Natural England prior to submission of the hybrid Bill. The Mere, Mere SSSI is assessed in the Pickmere to Agden and Hulseheath area (MAo3).
- 7.4.6 A study to inform the Habitats Regulations Screening Assessment was undertaken for Rostherne Mere Ramsar site⁶² during the Appraisal of Sustainability stage of the project development. This was undertaken in consultation with Natural England and the Environment Agency. It concluded that with inclusion of the design-led avoidance measures, should they prove necessary, impacts on the groundwater regime (and therefore the water levels and water quality in Rostherne Mere) would be insignificant and that no likely significant effect to the Ramsar site would occur, and Appropriate Assessment is not required. HS2 Ltd will continue to consult with these bodies (and other relevant key stakeholders) as the design develops to ensure that the submitted design in the hybrid Bill complies with the Habitats Regulations 2017. Further assessment is being carried out as discussed in Section 15 Water resources and flood risk, and an appropriate design will be developed through an iterative process. Any studies to inform the required assessments will be completed and the outcomes agreed with Natural England prior to submission of the hybrid Bill.
- 7.4.7 Rostherne Mere SSSI and NNR is designated because it is one of the deepest and largest of the meres of the Shropshire-Cheshire Plain. The land required for the Proposed Scheme between Hulseheath and Agden Lane is situated 10m from the SSSI/NNR, on the opposite side of Cherry Tree Lane. The aquatic habitats that are a reason for the SSSI are also the reason for the designation of the Rostherne Mere Ramsar site for which the Screening Report in 2012 concluded that there would be no likely significant impacts. The ongoing consultation, appropriate design and where required, further assessment being undertaken to ensure there is no adverse impact on the Ramsar site will also

⁶¹ HS2 (2012). *HRA Screening Report for Midland Meres and Mosses Phase 1 Ramsar Site*

⁶² HS2 (2012), *HRA Screening Report for Rostherne Mere Ramsar Site*

avoid adverse impacts on the integrity of the aquatic habitats in the SSSI. Any risk of disturbance to the water bird assemblage for which the SSSI/NNR is also designated will be controlled through measures in the draft CoCP. Consequently, there would be no adverse effects on the integrity of the SSSI.

- 7.4.8 Cotteril Clough SSSI is designated for its woodland habitats and associated plants, birds and invertebrates and is located 610m south of land required for the Proposed Scheme. Cotteril Clough Brook runs through the SSSI and joins the River Bollin, which is within the land required for construction of the Proposed Scheme 700m downstream of the SSSI, and as such, hydrological connectivity is limited. The SSSI is located adjacent to the A538 Wilmslow Road and Mill Lane, which would be used as construction access routes, and therefore there is potential for adverse effects from airborne pollution. It is anticipated that implementation of measures in the draft CoCP would reduce the magnitude of these impacts to a level where there would be no significant effects. However, on a precautionary basis and in the absence of further information, at this stage the assessment assumes there would be a temporary adverse effect, which would be significant at national level.
- 7.4.9 Construction of the viaduct over Blackburn's Brook and Birkin Brook floodplains would result in the permanent loss of 1.1ha (81%) of ancient woodland and severance of habitats within Hancock's Bank South LWS and Hancock's Bank AWIS. Habitat loss and severance of this extent would result in a permanent adverse effect on site integrity that would be significant at the county/metropolitan level.
- 7.4.10 Construction of the viaduct over Blackburn's Brook and Birkin Brook floodplains would result in the permanent loss of 100m² (0.3%) of habitats within Ryecroft Covert LWS. Habitat loss would result in the permanent adverse effect on site integrity that would be significant at the district/borough level.
- 7.4.11 Construction of Ashley embankment and Mobberley Road diversion would result in the loss of 300m² (1.2%) of ancient woodland within Wood near Arden House LWS and Arden House Wood AWIS. Habitat loss of this extent would result in the permanent adverse effect on site integrity that would be significant at the district/borough level.
- 7.4.12 Construction of Ashley embankment would result in the permanent loss of 1.5ha (62%) of Erlam's Meadow LWS. Habitat loss and severance of this extent would result in a permanent adverse effect on site integrity that would be significant at the county/metropolitan level.
- 7.4.13 Construction of Ashley embankment would result in the permanent loss of 0.8ha (27%) of Ecclesfield Wood LWS. Habitat loss would result in a permanent adverse effect on site integrity that would be significant at the county/metropolitan level.
- 7.4.14 Construction of Ashley embankment would result in the permanent loss of 100m² (0.4%) of Brickhill Wood LWS. Habitat loss would result in a permanent

adverse effect on site integrity that would be significant at the district/borough level.

- 7.4.15 Construction of the viaduct over River Bollin floodplain would result in the permanent loss of 100m² (0.1%) of Wood near Chapel Lane SBI. Habitat loss would result in a permanent adverse effect on site integrity that would be significant at the district/borough level.
- 7.4.16 Construction of the viaduct over River Bollin floodplain, Halebank Cutting, M56 East box structure and Manchester Airport High Speed Station cutting would result in the permanent loss of 0.3ha (1%) of Sunbank Wood and Ponds SBI. Construction in this area is likely to require some dewatering, temporarily lowering groundwater levels locally and potentially causing groundwater flow to converge on the cutting. This could result in the reduction of baseflow to watercourses within Sunbank Wood AWIS and Sunbank Wood and Ponds SBI. Habitat loss and hydrological effects on habitats would result in a permanent adverse effect on site integrity that would be significant at the county/metropolitan level.
- 7.4.17 Construction of the proposed Manchester Airport High Speed Station cutting would result in the permanent loss of 1.8ha (50%) of ancient woodland within Davenport Green Wood SBI and undesignated ancient woodland. Habitat loss would result in the permanent adverse effect on site integrity that would be significant at the county/metropolitan level.

Habitats

Woodland

- 7.4.18 In addition to the aforementioned loss of woodland from designated sites, construction would result in the loss of 4.8ha of broadleaved woodland east of Ivy House Farm, south of Booth Bank Farm, south of Lamb's Covert, near Birkin Farm, along the River Bollin and at junction 6 of the M56. This would result in a permanent adverse effect that is significant at up to county/metropolitan level. The provision of new woodland would connect and help maintain the integrity of remaining areas of woodland. A temporary adverse effect is expected until these woodland areas have become established, after which there would be a reduced effect on broadleaved woodland 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

- 7.4.19 Construction of the Proposed Scheme could result in the loss of grassland outside designated sites. It has been assumed that none of the grassland lost would be unimproved. The loss of grassland habitats would result in a permanent adverse effect that is significant at up to the district/borough level. The provision of 7.2ha of new grassland habitats, including some species rich grasslands and meadow creation south of Ashley, south of Hough Green Farm, north of Lower House Farm and adjacent to Flaxhigh Covert, once established,

would reduce the adverse effect on grassland habitats to a level that is not significant.

Hedgerows

- 7.4.20 The Proposed Scheme would cross hedgerows that are located throughout the Hulseheath to Manchester Airport 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. Further hedgerow planting will be proposed as part of the design development. 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

- 7.4.21 The Proposed Scheme would cross Agden Brook, Blackburn's Brook, Birkin Brook and the River Bollin on viaducts. These watercourses would not be directly affected, and indirect effects would not be significant as they would be controlled through the implementation of measures in the draft CoCP. However, the Proposed Scheme would result in the loss of sections of other smaller watercourses including Millington Clough and Timperley Brook and severance of river corridors due to culverts, which would result, on a precautionary basis, in a permanent effect that would be significant at up to the district/borough level.

Water bodies

- 7.4.22 Thirty-seven ponds would be lost as a result of the construction of the Proposed Scheme. The loss of these ponds could result, on a precautionary basis, in an impact that would be significant at up to county/metropolitan level, if it is confirmed through field surveys that they support great crested newts or other priority species. It is considered likely that the aforementioned pond and grassland habitat creation would be sufficient to reduce the effect of the loss of these ponds to a level that is not significant. However, on a precautionary basis and in the absence of survey data, at this stage the assessment assumes that there would be a temporary adverse effect, which would be significant at the county/metropolitan level.

Ancient and veteran trees

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

Species

Bats

- 7.4.24 The permanent removal of vegetation may impact 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 eight bat species known to be 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 the application of the measures in the draft CoCP. On a precautionary basis, in the absence of further survey information, it has been assumed that impacts would result in a permanent adverse effect on the conservation status of the bat populations that would be significant at up to the regional level.

Otter

- 7.4.25 Otters have been recorded on the River Bollin within the land required for the Proposed Scheme. The viaducts over Agden Brook and the River Bollin would avoid loss of habitat along the river corridor. Indirect effects from construction activities may result in disturbance to these species during the construction period, and prevent them from moving along them. However, it is anticipated that these indirect effects would be controlled through the application of the measures in the draft CoCP. Habitat loss would occur on several smaller watercourses that would be crossed by the Proposed Scheme. On a precautionary basis, in the absence of survey information, impacts to otters would result in an adverse effect on the conservation status of these species that would be significant up to the county/metropolitan level.

Water vole

- 7.4.26 Water vole have been recorded along Agden Brook, Rostherne Mere and Blackburn's Brook within 80m of the land required for the Proposed Scheme. The viaducts over Agden Brook and the River Bollin would avoid loss of habitat along the river corridor. Indirect effects from construction activities may result in disturbance to these species during the construction period, and prevent them from moving along them. However, it is anticipated that these indirect effects would be controlled through the application of the measures in the draft CoCP. Habitat loss would occur on several smaller watercourses that would be crossed by the Proposed Scheme. On a precautionary basis, in the absence of survey information, impacts to water vole would result in an adverse effect on the conservation status of these species that would be significant up to the county/metropolitan level.

Polecat

- 7.4.27 The loss of woodland and hedgerow habitats along with grassland and arable land could affect polecat, a species that has been recorded between Hale and Davenport Green. On a precautionary basis 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

- 7.4.28 It has been assumed that all 37 ponds (and surrounding terrestrial habitat) within the land required for construction of the Proposed Scheme may support great crested newts, and would be lost during construction. The loss of ponds supporting great crested newts and associated terrestrial habitat could result in the isolation and severance of breeding populations of great crested newts across this area. On a precautionary basis, in the absence of further survey information, it has been assumed that all ponds that would be lost support great crested newts. Where great crested newts are present, two new ponds would be created for every one lost to the permanent works, and this would contribute towards reducing the effects to not significant. 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 be undertaken as part of scheme design development and included in the formal ES. 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

- 7.4.29 The Proposed Scheme would result in the loss of nesting and foraging habitat for a range of breeding and wintering birds, predominantly farmland and woodland species. These are likely to include barn owl, a Schedule 1 species, which has been recorded at Rostherne Mere, within 500m of land required for the Proposed Scheme. On a precautionary basis, 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.

White clawed crayfish

- 7.4.30 The land required for construction of the Proposed Scheme would result in loss of habitat suitable for white clawed crayfish. The proposed viaducts over Agden Brook and the River Bollin would avoid loss of habitat with potential to support this species, along the river corridor. Indirect effects from construction activities such as siltation and sedimentation may result in decreased water quality, which may affect white clawed crayfish. However, it is anticipated that these indirect effects would be controlled through the application of the measures in the draft CoCP. Habitat loss would occur on several smaller watercourses that would be crossed by the Proposed Scheme. On a precautionary basis, in the absence of survey information, it has been assumed that the Proposed Scheme would result in a permanent adverse effect that would be significant at up to the county/metropolitan level.

Aquatic invertebrates

- 7.4.31 The land required for construction of the Proposed Scheme in the Hulseheath to Manchester Airport area would result in loss of habitat suitable for aquatic invertebrates, (potentially including rare and notable species). The viaducts over

Agden Brook and the River Bollin would however avoid loss of habitat along the river corridor. Indirect effects from construction activities such as siltation and sedimentation may result in decreased water quality, which may affect aquatic invertebrate species. However, it is anticipated that these indirect effects would be controlled through the application of the measures in the draft CoCP.

- 7.4.32 Habitat loss would occur on several smaller watercourses that would be crossed by the Proposed Scheme. It has been assumed that all 37 ponds within the land required for construction of the Proposed Scheme may support notable aquatic invertebrates, and would be lost during construction. On a precautionary basis, in the absence of survey information, it has been assumed that Proposed Scheme would result in a permanent adverse effect that would be significant at up to the district/borough level.

Terrestrial invertebrates

- 7.4.33 The land required for construction of the Proposed Scheme would result in loss of habitat suitable for terrestrial invertebrates (including Section 41 species) including woodland, hedgerows and grassland, which may support notable terrestrial invertebrates. These are likely to include sites such as woodland habitat at Hancock's Bank South LWS, Ryecroft Covert LWS, Wood near Arden House LWS, Ecclesfield Wood LWS, Sunbank Wood and Ponds SBI, Wood Near Chapel Lane SBI, Davenport Green Wood SBI and meadow habitat at Erlam's Meadow LWS located within the land required for the Proposed Scheme. Indirect effects from construction activities may result in changes to habitats present, which may affect terrestrial invertebrate species. However, it is anticipated that these indirect effects would be controlled through the application of the measures in the draft CoCP. On a precautionary basis, 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

- 7.4.34 There are records of fish from the main watercourses including species such as European bullhead and brook lamprey (both listed on Annex II of the EC Habitats Directive)⁶³ eel and brown trout. The Proposed Scheme would pass over these watercourses, such as Agden Brook and the River Bollin, on viaducts, and indirect impacts to the watercourses would be controlled through measures set out in the draft CoCP. However, other smaller watercourses would still be affected and may require assessment under the Water Framework Directive (WFD)⁶⁴. On a precautionary basis, in the absence of survey information, it has been assumed that the Proposed Scheme would result in a permanent adverse effect that would be significant at up to the district/borough level.

⁶³ Annex 2 of the EU's Habitats Directive (1992) lists priority species whose conservation requires the designation of Special Areas of Conservation

⁶⁴ EU Water Framework Directive: http://ec.europa.eu/environment/water/water-framework/index_en.html

Reptiles

- 7.4.35 Common reptiles have not been recorded within 2km of the land required for construction of the Proposed Scheme. However, suitable habitat is likely to be present for reptiles including grass snake near the watercourses, and common lizard and slow worm in grassland and scrub habitats. On a precautionary basis 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.
- 7.4.36 Effects on other habitats and species that would be significant at the local/parish level during construction will be reported in the formal ES.
- 7.4.37 Indirect effects from changes in air quality, such as that arising from increased levels of construction access, will be considered where appropriate. These effects will be reported in the formal ES.

Other mitigation measures

- 7.4.38 Further measures currently being considered, but which are not yet part of the design and will be informed by the findings of the ongoing field surveys and engagement with relevant stakeholders, include:
- options to avoid or mitigate the loss of habitat at Erlam's Meadow LWS, Ecclesfield Wood LWS, Brickhill Wood LWS and Sunbank Wood and Ponds SBI;
 - considering the need for inclusion of structures to reduce severance effects on bats;
 - provision of additional measures to facilitate connectivity where significant foraging or commuting routes of fauna species would be affected;
 - use of temporary fencing or retention of existing habitat links to reduce the risk of disturbance to otters during construction; design of watercourse culverts and underpasses to allow the free passage of wildlife;
 - provision of alternative roosting habitat for bats; and
 - provision of additional ponds (on a two to one basis where existing ponds supporting great crested newts are lost), outside the area required for the permanent works but within the land required for construction of the Proposed Scheme, and suitable terrestrial habitat around these ponds with habitat links to allow dispersal.
- 7.4.39 Some of the above may also be achieved through strategic mitigation, which is currently being discussed with relevant stakeholders.
- 7.4.40 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.

Summary of likely residual significant effects

7.4.41 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 12.

Table 12: Residual significant effects on ecological resources/features during construction

Resource/feature	Residual effect	Level at which the effect would be significant
Cotteril Clough SSSI	Temporary adverse effect on site integrity due to airborne pollution from construction traffic	National
Hancock's Bank South LWS and Hancock's Bank AWIS	Permanent adverse effect on site integrity due to loss and severance of 1.1ha (81%) of habitats	County/metropolitan
Ryecroft Covert LWS	Permanent adverse effect on site integrity due to loss of 100m ² (0.3%) of habitats	District/borough
Wood near Arden House LWS and Arden House Wood AWIS	Permanent adverse effect on site integrity due to loss of 300m ² (1.2%) of ancient woodland	District/borough
Erlam's Meadow LWS	Permanent adverse effect on site integrity due to loss and severance of 1.5ha (62%) of habitats	County/metropolitan
Ecclesfield Wood LWS	Permanent adverse effect on site integrity due to loss of 0.8ha (27%) of habitats	County/metropolitan
Brickhill Wood LWS	Permanent adverse effect on site integrity due to loss of 100m ² (0.4%) of habitats	District/borough
Wood near Chapel Lane SBI	Permanent adverse effect on site integrity due to loss of 100m ² (0.1%) of habitats	District/borough
Sunbank Wood and Ponds SBI and Sunbank Wood AWIS	Permanent adverse effect on site integrity due to loss of 0.3ha (1%) of habitats (SBI) and reduction in groundwater flow and levels (SBI and AWIS)	District/borough
Davenport Green Wood SBI and undesignated ancient woodland	Permanent adverse effect on the site integrity due to loss of 1.8ha (50%) of ancient woodland	County/metropolitan

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Resource/feature	Residual effect	Level at which the effect would be significant
Woodlands	Potential adverse effect on unidentified ancient woodland	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
Water bodies	Permanent adverse effect from loss of 37 ponds	Up to county/metropolitan
Ancient and veteran trees	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
Great crested newts	Loss of 37 ponds and surrounding terrestrial habitat which may support great crested newts	Up to county/metropolitan
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	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 county/metropolitan level.
- 7.5.4 Barn owls are at risk of colliding with trains, particularly near Blackburn's Brook and Erlam's Meadow 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 plan⁶⁵ 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.

⁶⁵ Currently in development for Phase One of HS2

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 13.

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

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

Monitoring

- 7.5.8 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 Hulseheath to Manchester Airport area.

8 Health

8.1 Introduction

- 8.1.1 This section identifies the communities within the Hulseheath to Manchester Airport 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 Hulseheath to Manchester Airport 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: MAo6 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)⁶⁶.
- 8.2.2 As set out in the SMR, the health assessment is based on a broad understanding of health, consistent with the World Health Organization (WHO) definition of health as 'a state of complete physical, mental and social 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.

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

- 8.2.4 The health determinants of relevance within the Hulseheath to Manchester Airport 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; and
 - social capital.
- 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

Description of communities in the Hulseheath to Manchester Airport area

- 8.3.1 The route of the Proposed Scheme would extend from Hulseheath in the west, passing close to the settlements of Booth Bank, Ashley, Thorns Green, Halebank, Warburton Green, Hale Barns, and Davenport Green in the east. Manchester Airport is located to the south of Halebank, and to the south of the route of the Proposed Scheme.
- 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.

Hulseheath, Rostherne and surrounds

- 8.3.3 This area covers the settlements of Hulseheath, Rostherne and surrounds. This area is characterised by areas of farmland interspersed with hamlets or individual residential properties, some of the residential properties would be on the route of the Proposed Scheme. The Children's Adventure Farm Trust (CAFT) at Booth Bank Farm, approximately 470m from the Proposed Scheme, is an open farm providing activities and holiday respite accommodation for disabled and disadvantaged children. Bucklow Manor Nursing Home, located approximately 700m south of the route of the Proposed Scheme at the junction of Millington Lane and Chester Road, serves those with age-related care needs.
- 8.3.4 Rostherne Mere site of special scientific interest (SSSI) and National Nature Reserve is located in the centre of the area, 250m south of the route of the Proposed Scheme. Rostherne Mere is not publicly accessible, although there is a public footpath and viewpoint to the west of the mere. There are a limited number of community facilities in the village Rostherne, namely St Mary's Church of England church and Rostherne Cricket Ground. Tatton Park is a large National Trust property located to the south of Rostherne.

Ashley, Thorns Green, Halebank and surrounds

- 8.3.5 The village of Ashley, which has approximately 70 residential properties, is located to the north of the route of the Proposed Scheme. The nearest residential properties would be approximately 50m from the Proposed Scheme. Ashley has a range of community facilities including Sunnyside Pre-school Nursery and St Elizabeth's Church; and recreational facilities such as the Ashley Cricket Club and The Greyhound public house. The M56 runs to the north of Ashley.
- 8.3.6 The hamlet of Thorns Green, which has approximately 20 residential properties, is located west of Ashley. Higher Thorns Green Farm is a large farm located on the route of the Proposed Scheme. The farm provides social and education farm experiences, including outreach projects for people with learning difficulties.

- 8.3.7 Halebank has approximately 20 residential properties and is located on the route of the Proposed Scheme. Sunbank Wood is a publicly accessible woodland area of approximately 13ha located to the south of Halebank.

Warburton Green, Hale Barns, Davenport Green and surrounds

- 8.3.8 Situated to the north of the M56, Hale Barns and Warburton Green lie on the south-west outskirts of Altrincham. The area includes several schools and places of worship. There is also a health centre, care homes and recreational facilities such as Hale Golf Club, Ringway Golf Club, the Tennis Club and Hale Barns Cricket Club. Two community facilities – Hale Barns Cricket Club (accessed via Brooks Drive) and Cliffemount Community Care Home (a residential care home on Hale Road catering for people requiring complex care) – are located within 250m of the route of the Proposed Scheme.

Demographic and health profile of the Hulseheath to Manchester Airport area

- 8.3.9 The local communities potentially affected by the Proposed Scheme in the Hulseheath to Manchester Airport area have a relatively low population density, commensurate with the rural nature of the area.
- 8.3.10 Data provided by the Office for National Statistics⁶⁷ show that this population has comparable health status to the national (England) averages.
- 8.3.11 The population is less deprived than the national average with regard to the combined indices of multiple deprivation⁶⁸, and the health domain (a sub-set of the indices of multiple deprivation).
- 8.3.12 This area as a whole is considered to be more 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.
- 8.3.13 The available data provides detail down to ward level and enables a profile to be made of the population within the Hulseheath to Manchester Airport 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. Adverse impacts on health determinants have been reduced as far as reasonably practicable through

⁶⁷ 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.

⁶⁸ 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>

mitigation measures incorporated into the design of the Proposed Scheme to reduce 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, as far as reasonably practicable;
- reducing visual intrusion and noise, as far as reasonably practicable;
- incorporating landscape design and screening into the design; and
- 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 as far 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)⁶⁹, which provides a general basis for route-wide construction environmental management. Contractors would also be required to comply with the measures in Local Environmental Management Plans (LEMP), which apply the environmental management strategies at a local level.
- 8.4.4 The CoCP will be the means of controlling the construction works associated with the Proposed Scheme to ensure that the effects of the works upon people and the natural environment are reduced or avoided insofar as reasonably practicable.
- 8.4.5 The CoCP will require the nominated undertaker and its contractors to: produce and implement a community engagement framework and provide appropriately experienced community relations personnel to implement the framework; provide 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;

⁶⁹ Supporting document: Draft Code of Construction Practice

- improving accessibility to other community facilities; and/or
- identifying land owned by the relevant local authority that could be brought into use as a community facility with its agreement.

Assessment of impacts and effects

Neighbourhood quality

- 8.4.7 The term 'neighbourhood quality' is used in this assessment to describe the combination of environmental factors that influence people's experience of, and feelings about, their local environment. When these factors are altered people's levels of satisfaction with their living environment may change. In turn, this could affect mental wellbeing or behaviours such as the use of outside space.
- 8.4.8 The construction of the Proposed Scheme will affect neighbourhood quality through impacts such as noise, air emissions, visual impacts and additional traffic, including heavy goods vehicles (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 Hulseheath to Manchester Airport 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 permanent⁷⁹ impacts on neighbourhood quality in areas close to construction sites, including those at Hulseheath, Booth Bank, Ashley, Thorns Green, Warburton Green, Hale Bank and Davenport Green. Impacts on neighbourhood quality have the potential to affect the wellbeing of residents adversely during the construction phase, by giving rise to negative feelings in relation to quality of life and the local environment, and potentially changing behaviours, such as deterring the use of outdoor space.
- 8.4.13 Construction noise would have the potential to generate a noticeable change in noise at outdoor areas and at neighbourhoods in proximity to the route of the Proposed Scheme, as listed in Section 13, Sound, noise and vibration. It is currently expected that the construction of the Proposed Scheme may be visible from a number of locations, as listed in Section 11, Landscape and visual. These impacts have the potential to contribute to impacts on neighbourhood quality. This will be assessed in the formal ES.
- 8.4.14 Traffic and transport impacts in the Hulseheath to Manchester Airport 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 In the area around Thorns Green, construction of the Thorns Green cutting, Castle Mill Lane realignment and Castle Mill Lane overbridge would require the demolition of Higher Thorns Green Farm. The Farm makes use of a working

⁷⁹ The SMR defines temporary changes (impacts) to health determinants as short term (<6 months), medium term (6 months – 2 years), and long term (2 years +). Permanent impacts have not been defined in the SMR. A change in a health determinant lasting 4 years or more will be considered as a permanent impact. A professional judgement will be made as to when an impact would lead to a permanent effect on the health of the population.

farm environment to provide social and educational opportunities based around animal husbandry and the growing and cooking of food. The farm also hosts the Fairfield Farm Project, which is run by Fairfield Care. The project provides farm based activities as part of an outreach programme for children and adults receiving care, supported by qualified care staff. The project specialises in assisting young people with autism conditions and learning disabilities. There are limited other farms that provide a similar service – the Children’s Adventure Farm Trust at Booth Bank Farm is located approximately 8km away, however, Higher Thorns Green Farm provides a different variety of support, particularly for vulnerable people within the community. Therefore, the loss of this facility has the potential to result in an adverse health effect.

8.4.19 In the Hale Barns area, works to construct the Manchester Airport High Speed station cutting would require the demolition of Cliffemount Community Care Home on Hale Road. The privately-owned service is registered to provide on-site accommodation for up to five people requiring complex care, with a stated specialism for supporting younger adults with learning disabilities and those diagnosed to be on the autistic spectrum. The demolition of Cliffemount Community Care Home would require existing residents to be relocated and reduce the availability of specialist residential care for others in the jurisdiction of Trafford Metropolitan Borough Council (TMBC). The permanent loss of this service has the potential to result in an adverse health effect.

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

Access to green space, recreation and physical activity

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

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

- impacts 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.

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

8.4.24 Construction traffic would mainly use site haul routes along the route of the Proposed Scheme. Some construction traffic, however, including HGVs, would be present on local roads. This could obstruct or deter pedestrians, cyclists and equestrians from using these routes. In the case of recreational users, it is considered that alternative routes are likely to be available in most cases, and therefore that impacts on the affected roads would not reduce overall levels of recreational NMUs. For those using affected routes for active travel to work or to access shops and services, there is the possibility that people would choose instead to travel by car, temporarily reducing levels of physical activity and associated health and wellbeing benefits.

Social capital

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

'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.'⁷¹

8.4.26 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.

8.4.27 The villages along the route of the Proposed Scheme 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

⁷¹ Office for National Statistics- Measuring Social Capital:
http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/dcp171766_371693.pdf

throughout the area, including main compounds and satellite compounds in the vicinity of the settlements of Hulseheath, Booth Bank, Ashley, Thorns Green, Warburton Green, Hale Bank and Davenport Green. The duration of the works at each site would range from approximately two years to approximately six 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.

- 8.4.28 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.
- 8.4.29 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.
- 8.4.30 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.
- 8.4.31 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.
- 8.4.32 When homes are lost from within a community, there is a potential for the remaining community to experience changes to their social environment and loss of social networks. For this to have an adverse impact on overall levels of social capital, the loss of homes would need to make up a sizeable proportion of the community. Residential properties would be demolished at Hulseheath and Hale Barns. In addition, several farm buildings (including residential) would be lost through land required to construct and operate the Proposed Scheme. These losses do not represent sizable proportions of those communities, and

therefore no health effects are anticipated in the remaining community. Effects on residents directly impacted by demolitions are assessed in Volume 3, Section 7, Health.

- 8.4.33 The Proposed Scheme would result in the demolition of five properties in the village of Thorns Green and five properties in the village of Hale Bank. The loss of these residential properties represents a sizable proportion of the community. The erosion of social networks resulting from these demolitions would have the potential to reduce social capital, reducing the beneficial health effects that are gained through social contact and support.
- 8.4.34 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

- 8.4.35 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.
- 8.4.36 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.
- 8.4.37 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 Hulseheath to Manchester Airport 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.

Social capital

- 8.5.3 The presence of new physical infrastructure and operation of the Proposed Scheme may influence the connections affecting the communities of Booth Bank and Ashley. The Proposed Scheme would include new infrastructure to the south and to the west of Booth Bank, in addition to the existing M56, which runs immediately to north of the settlement. The route of the Proposed Scheme would arc from the west of Ashley, around the south and would continue to the east, where it would intersect the M56, which runs to the north of Ashley. Although new and replacement road and pedestrian connections would be provided and journey times are not expected to be substantially affected, the operation of the Proposed Scheme would have the potential to result in psychological separation, and therefore reduce the beneficial health effects that are gained through social contact and support at these two settlements. This will be assessed and reported in the formal ES.

Other mitigation measures

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

Monitoring

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

9 Historic environment

9.1 Introduction

- 9.1.1 This section of the report provides a description of the current baseline for heritage assets and the likely impacts and significant effects identified to date resulting from the construction and operation of the Proposed Scheme within the Hulseheath to Manchester Airport 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, Cheshire East Council (CEC), Manchester City Council (MCC), and the Greater Manchester Archaeological Advisory Service and Cheshire Archaeology Planning 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: MAo6 Map Book. Only designated heritage assets within the Hulseheath to Manchester Airport area are shown on maps CT-10-319 to CT-10-322a. 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). 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)⁷², including the method for determining the value of a heritage asset and magnitude of impact (tables 19 and 20 in the SMR, respectively).

⁷² Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

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

9.2.11 At the time of writing the Cheshire HER data was not available and will be reported in full in 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);
- Cheshire and Greater Manchester historic environment records;
- 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 One designated heritage asset is located partially or wholly within the land required for the Proposed Scheme: Buckhall, the Manchester Airport Marriott Hotel (listed as Buckhall, The Four Seasons Hotel), Wilmslow Road, Hale (NHLE 1067598), a Grade II listed building of moderate value.

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

- one scheduled monument - Watch Hill motte and bailey castle, 450m south of Streethead Farm, Bowden (NHLE 1014377), an asset of high value;
- two Grade II* registered parks and gardens - Tatton Park (NHLE 1000501) and Dunham Massey (NHLE 1000853), all assets of high value;
- one Grade I listed building, St Mary's Church, Rostherne (NHLE 1230301), an asset of high value;
- three Grade II* listed buildings - Church of St Mary the Virgin, Bowden (NHLE 1122650), Hale Chapel, Chapel Lane, Hale (NHLE 1356500), and Halecroft, Hale Road, Hale (NHLE 1356501), all assets of high value;
- 54 Grade II listed buildings including - 23 17th to 19th century farmhouses and associated structures dotted across the landscape including Boothbank Farmhouse, Millington (NHLE 1278882); Millington

Hall (NHLE 1329640); Hough Green Farmhouse, Ashley (NHLE 1229540); Lower House Farmhouse, Ashley (NHLE 1139588); Yewtree Farmhouse, Halebank (NHLE 1356625); and Davenportgreen Farmhouse (NHLE 1067885) and Barn (NHLE 1067884). Seven rural cottages including Mere Covert Cottage, Rostherne (NHLE 1329668) and Sycamore Cottage, Ashley (NHLE 1139583). Four 18th to 19th century chapels and churches including Church of St Elizabeth, Ashley (NHLE 1139584) and two bridges over the River Bollin all assets of moderate value; and

- Two conservation areas, Rostherne, which covers the estate village of Rostherne (part of the Tatton Estate) and the South Hale Conservation Area, all assets of moderate value.

Non-designated assets

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

- Cherry Tree Farm, Cherry Tree Lane, Rostherne;
- Bowden View Farm, Tom Lane, Rostherne;
- Bowden View Farm Cottage and Pembroke House, Tom Lane, Rostherne;
- Mid Cheshire Line, an extant railway line;
- Higher Thorns Green Farm, Castle Mill Lane, Thorns Green;
- Pigley Stair cottages (Pigley Stair Cottage - now known as Thorns Green Cottage), Magnolia Cottage, Rose Cottage and Thorn Cottage, Castle Mill Lane, Thorns Green;
- 56 Sunbank Lane, Halebank; and
- Fern Cottage, Hale Road, Hale Barns.

Historic environment overview

9.3.6 No evidence has been identified for early prehistoric human activity within the study area prior to the Late Mesolithic period. Flint scatters, potentially representing flint knapping for blade tools dating to the Late Mesolithic have been recorded during investigations resulting from the development of a second runway at Manchester Airport and at Tatton Park. Occupation at these two sites continued into the Neolithic period with post-built structures indicating settlement activity at both the Airport and Tatton Park.

9.3.7 The evidence for the Bronze Age within the 500m study area and the wider upland Pennine fringes is dominated by funerary (burial) monuments in particular round barrow burial mounds. Excavation as part of the construction of the A556 Knutsford to Bowden Relief Road has produced evidence of a Bronze Age funerary landscape at Bucklow Hill. This comprised a ploughed out round barrow, which served as the focus for a range of funerary rituals. Within the

500m study area, just to the south of Rostherne village, core aerial photographs revealed the presence of a group of round barrow burial mounds. Although poorly understood, the agriculture of the area prior to the Roman period is assumed to have been mixed agrarian and livestock raising. There is little evidence of Iron Age field systems in the study area but this may be a result of the absence of investigation, rather than a lack of agricultural activity.

- 9.3.8 The Romano-British period began within the region with the expansion of Roman occupation north of the midlands from AD70. The Roman fortress of *Deva Vitrix* was established at Chester in AD74 to AD75 to enable the control of North Wales and North-West England. A network of roads spread out across the North-West from Chester, including one known locally as Watling Street, which ran from Chester to Northwich and on to the Roman fort of *Mamucium* (Manchester) through the study area. Outside of the major settlements were rural enclosed farmsteads.
- 9.3.9 In the early medieval period, archaeological evidence becomes increasingly scant and is dependent on documentary sources. Cheshire became part of unified England by the early 10th century AD. The medieval settlements of Tatton, Dunham, Ashley, Rostherne, Bowden and Hale located along the route of the Proposed Scheme are recorded in the Domesday Book. Following the Norman Conquest, these settlements fell under the manors of Hamon de Massey and 'Gilbert the Hunter', under the Earl of Chester.
- 9.3.10 There are potentially three medieval motte and bailey castle sites located along the River Bollin Valley. These include Watch Hill, located at the King Street crossing of the River Bollin and Ullerswood, near Castle Hill, Ringway. The third at Dunham is located within the Pickmere to Agden and Hulseheath area (MAo3). All three motte and bailey castles seem to have been built in a short time frame, and only had a short lifespan. Documentary evidence indicates that the motte and baileys were held by Hamon de Massey III in 1173 and were possibly constructed as part of his involvement in the revolt of 1173-74 against Henry II.
- 9.3.11 Both Dunham Massey, which is largely located within the Pickmere to Agden and Hulseheath area (MAo3) and Tatton Park represent parks with medieval origins. Created as deer parks, the estates were originally held by the same family (de Massey), before the Tatton Estate passed to the Brereton through marriage in the 15th century and then onto the Egerton family. Tatton Park was remodelled in the 18th century, leading to the creation of an open parkland, designed by Repton.
- 9.3.12 During the post medieval period the poor quality of the soils slowed the process of land enclosure, however, this was largely complete by the early 19th century. The enclosure of land was driven by increasing demand from growing markets in the West Midlands and the North-West and a requirement for improved land that saw poor quality land, such as heaths, brought into agricultural use. Improvements in the management of cattle and pasture enabled a substantial increase in the size of livestock herds. This was in part driven by the agricultural

driven development by the great Cheshire estates, including Dunham Massey and Tatton Park, which include the creation of model farms such as Tatton Park Farm and Home Farm at Dunham Massey. The move towards the in-wintering of cattle and the development of crops designed specifically to feed livestock led to changes in the layout and function of traditional farm buildings. These improvements often resulted in the amalgamation of holdings and complete rebuilding of farm buildings. This can be seen in the pattern of 19th century farmsteads located across the 500m study area, such as Bowden View Farm and Cherry Tree Farm, Rostherne. The remodelling of the landscape can also be seen by the construction of estate cottages at Rostherne and a construction of a church (Church of St Elizabeth) at Ashly, both constructed by the Egerton family.

- 9.3.13 Transport links were improved from the 18th century including the introduction of toll roads, and the construction of the Mid-Cheshire railway line. This was brought about by the development and growth of the industrial towns of the West Midlands and the North, which required improved communication and transport routes.
- 9.3.14 The landscape within the 2km study area remained largely unchanged through the late 19th century into the early 20th century. However, in 1935 construction started on Ringway Airport, at the eastern end of the community area, the chosen site of the civil airport for Manchester. The airport opened in 1937 and was used as a parachute training school during World War II. The mid to late 20th century saw the airport slow expansion gradual expansion, until the late 90s with the construction of the second runway, which was opened at the airport in 2001. The airport was renamed Manchester International Airport in the mid-1970s, following the construction of the M56 motorway, built to connect Manchester to the airport and the M6. The M56 runs east to west through the community area.

9.4 Effects arising during construction

Avoidance and mitigation measures

- 9.4.1 The design of the Proposed Scheme has sought to avoid impacts on heritage assets within the area as far as reasonably practicable.
- 9.4.2 Section 8 of the draft Code of Construction Practice (CoCP)⁷³ 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;

⁷³ Supporting document: Draft Code of Construction Practice

- 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 Davenportgreen Farmhouse (NHLE 1067885) and barn (NHLE 1067884), located on Roaring Gate Lane, Davenport Green, are both Grade II listed buildings of moderate value. The assets are both 18th century in date and with Paddy's Hut (an associated Grade II listed building (NHLE 1067886)), represent a surviving example of a late post medieval farmstead. Both the farmhouse and barn are located adjacent to the land required for the Proposed Scheme within the hamlet of Davenport Green. Both assets have strong visible presence on a busy rural tree-lined lane. Although the assets are located close to the suburban fringes of Manchester and Altrincham, their setting retains a strong rural character, which makes a positive contribution to their historic value. The assets are located adjacent to the land required for the construction of the Proposed Scheme and Roaring Gate Lane would be used as a construction route. The setting of the assets would be changed by activities associated with the land to the south being used as a construction compound for the Manchester Airport High Speed station. This would reduce the rural character of the setting by changing the nature of the historic agricultural landscape and therefore the historic context. This would constitute a temporary medium adverse impact resulting in a moderate adverse effect in relation to both assets.
- 9.4.6 Davenportgreen Hall (NHLE 1100238), located on Shay Lane, is a Grade II listed building of moderate value. The asset is located adjacent to a proposed site haul route and within 80m of land required for the construction of the Proposed Scheme. The asset is located within the rural fringe of Greater Manchester, within the hamlet of Davenport Green. It is a timber-framed former farmhouse, set within a large, quiet tree-lined garden, which screens the asset from the surrounding hamlet and farmland, and provides an enclosed setting and sense of intimacy. The tree-lined roads along which the asset is approached emphasise the rural character of its setting and add to the appreciation of

the asset. The land to the south of the asset would be used as a construction compound for the Manchester Airport High Speed station. The compound area is currently used as agricultural and though not visible from the asset forms part of its rural setting. The presence of the construction compound would temporarily change the character of the setting of the asset, affecting its historical farmland context and quietness around the asset, affecting the ability to appreciate it. This would constitute a temporary medium adverse impact and result in a moderate adverse effect.

Permanent effects

- 9.4.7 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.
- 9.4.8 The following significant effects are currently expected to occur as a result of permanent physical impacts on heritage assets within the land required for the construction and operation of the Proposed Scheme.
- 9.4.9 Buckhall at the Manchester Airport Marriott Hotel (NHLE 1067598), is a Grade II listed building of moderate value. The asset is located wholly in the land required to construct the Proposed Scheme. The asset is a former 18th century farmhouse and is located on the busy Hale Road, adjacent to the M56. It has been incorporated into an airport hotel, with adjoining modern extension of much greater mass than the original structure and is used as offices for the hotel. The asset would be demolished causing a high magnitude of impact and a major adverse effect.
- 9.4.10 Cherry Tree Farm, Cherry Tree Lane, Rostherne, is a non-designated asset of low value. The asset comprises a group of former barns and a farmhouse. These are located partially within the land required for the construction of the Proposed Scheme. It is a former late post-medieval farmstead, but all of the buildings are now used as offices. Located within farmland, there are long views from the asset to the south over Rostherne Mere, towards Rostherne parish church (NHLE 1230301). The barns are located within the land required for the construction of the Proposed Scheme and would be demolished causing a high magnitude of impact and a moderate adverse effect.
- 9.4.11 Bowden View Farm, Tom Lane, Rostherne, is a non-designated asset of low value. It is located wholly within the land required for the construction of the Proposed Scheme. It comprises a group of late post-medieval agricultural buildings and a farmhouse. The asset is located within an open farmland landscape, which adds to its character. The asset would be demolished causing a high magnitude of impact and a moderate adverse effect.
- 9.4.12 Bowden View Cottage and Pembroke House are non-designated assets of low value. They are wholly within the land required for the construction of the Proposed Scheme. The assets are a pair of late post-medieval cottages on Tom Lane, Rostherne. They are located close to Bowden View Farm and are within

an open farmland landscape. The assets would be demolished causing a high magnitude of impact and a moderate adverse effect.

- 9.4.13 Higher Thorns Green Farm, Thorns Green, is a non-designated asset of low value. The asset is located partially within the land required for the construction of the Proposed Scheme. It comprises a group of late post-medieval agricultural buildings, a farmhouse and modern agricultural sheds and is a working farm within an agricultural landscape. The construction of the Proposed Scheme would result in the demolition of the post-medieval courtyard barn and the farmhouse (as well as the modern agricultural buildings). This would cause a high magnitude of impact and a moderate adverse effect.
- 9.4.14 Pigley Stair cottages comprising Pigley Stair Cottage (Thorns Green Cottage), Magnolia Cottage, Rose Cottage and Thorn Cottage are non-designated assets of low value. The assets are wholly located within the land required for the construction of the Proposed Scheme. The assets are all post-medieval in date and form a small cluster of cottages located opposite Higher Thorns Green Farm. The assets would be demolished causing a high magnitude of impact and a moderate adverse effect.
- 9.4.15 Number 56 Sunbank Lane, Halebank is a non-designated asset of low value. It is a former post-medieval agricultural building of unknown use. The asset is located wholly within the land required for the construction of the Proposed Scheme. It is located in the small rural hamlet of Halebank within 100m of the M56 and near Manchester Airport. The asset has a prominent position on the lane within the hamlet, although its associated farmhouse has either been demolished or incorporated into a neighbouring large mid-20th century house. The rolling topography of the land around the hamlet and the mature planting in the area allows the hamlet in which the asset is located to retain its historic rural setting. The construction of the Proposed Scheme would result in the demolition of the asset. This would cause a high magnitude of impact and result in a moderate adverse effect.
- 9.4.16 Fern Cottage, Hale Road, Hale Barns, is a non-designated asset of low value. It is located wholly within the land required for the construction of the Proposed Scheme. The post-medieval cottage is located opposite the Grade II listed Buckhall (NHLE 1067598). It was formerly the only residential property located opposite the Buckhall farmstead, but 20th century development has spread along Hale road and the M56 now passes close to it. Despite this change to its setting the asset with Buckhall represents the surviving elements of the late post medieval rural landscape. The asset would be demolished for the construction of the Proposed Scheme. This would cause a high magnitude of impact and a moderate adverse effect.
- 9.4.17 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.
- 9.4.18 Mere Covert Cottage (NHLE 1329668), Cherry Tree Lane, Rostherne is a Grade II listed building of moderate value. It is located 200m to the south of land

required for the construction of the Proposed Scheme. The asset is a 17th century timber-framed building located just to the north of Rostherne Mere from which it is screened by woodland. The asset is located directly adjacent to Cherry Tree Lane, which forms part of the asset connection with the wider rural landscape. The lane is rural with three farmsteads and four cottages dispersed along a plateau. There are clear views from the northern side of the property across a large open field towards Bowden View Farm, although this asset is of a later period. The setting of the cottage is isolated and rural in character, in keeping with its historic context, which has remained largely unchanged from at least the 19th century. The construction of the Rostherne cutting would result in the demolition of Bowden View Farm, Cherry Tree Farm, Bowden View Farm Cottage and Pembroke House. This would change the character of Cherry Tree Lane, on which the asset is located, altering the historic setting of the asset, by reducing the historic context of the lane and the asset. This would cause a medium magnitude of impact, resulting in a moderate adverse effect.

- 9.4.19 Sycamore Cottage (NHLE 1139583), Ashley Road, Ashley, is a Grade II listed building of moderate value. The asset is a 17th century timber-framed building, located 200m to the north of the lane required for the Proposed Scheme. It is set back from the road within a garden enclosed hedged garden but with views of open farmland to the south from the upper stories. The asset is located over 100m from the nearest building and in an area of large, flat fields, with Ashley Cricket Club located directly south-east of the garden. The setting is isolated and rural and has remained unchanged from at least the mid-19th century. The proposed Ashley embankment would be visible to the south of the asset. The construction of the embankment would cause a permanent impact on the setting of asset by introducing changes to its historic context, particularly given its scale, massing and visual dominance. This would cause a medium magnitude of impact and a moderate adverse effect.
- 9.4.20 The Church of St Elizabeth (NHLE 1139584), Ashley Road, Ashley, is a Grade II listed building of moderate value. The asset is located 200m to the north of the land required for the Proposed Scheme. It was built for the parish of Ashley by the Tatton estate in the 1880s and is located in a small churchyard, within the village of Ashley. It has open views from the churchyard and church gate south over the village cricket ground towards open flat farmland, comprising large low hedged fields. This adds to how the asset is appreciated as a church serving a rural community within an agricultural setting that can be viewed from the churchyard and church gate. This landscape and views over it has changed little from its original 19th century setting adding to its historic value. The Ashley embankment south of Ashley would be visible from within the churchyard and from the church gate. The construction of the embankment would cause a permanent impact on the setting of the asset by altering the views south and physically changing the landscape, by adding a large visible barrier, resulting in a loss of appreciation of the rural fringe character of the setting and therefore, its contribution to the historic significance of the asset. This would cause a medium magnitude of impact and a moderate adverse effect.

- 9.4.21 Hough Green Farmhouse (NHLE 1229540) located on Mobberley Road, Ashley, is a Grade II listed building of moderate value. The asset is located directly adjacent to the land required for the construction of the Proposed Scheme. It is a brick-built 17th century farmhouse, located on a busy road in an area of flat open farmland over 100m from the village core. On the opposite side of the road are the heavily altered former agricultural buildings associated with the farmhouse and now used as residential properties. Although no longer a working farm, the asset retains its historic rural setting, which adds to how the asset is appreciated, and its historic value. The Ashley embankment and Mobberley Road underbridge would be located adjacent to the asset. The Proposed Scheme would create a visual barrier with the land to the south of the asset. The introduction of this barrier would remove much of the open farm land setting of the asset, making it difficult to appreciate its original historic farm context and changing the flat open landscape asset by adding a structure with a large mass. This would cause a high magnitude of impact and result in a major adverse effect
- 9.4.22 Lower House Farmhouse, Ashley (NHLE 1139588) is a Grade II listed building of moderate value. The asset is an 18th century red brick farmhouse with 19th century alterations. It is located 110m to the south-east of the land required for the construction of the Proposed Scheme. It is a working farm, with associated courtyard buildings, and is surrounded by flat open farmland. The rural setting of the asset has remained largely unchanged from at least the mid-19th century, which adds to its historical value. The Ashley embankment south of Ashley would be visible from the north side of the asset. The construction of the embankment would cause a permanent impact on the setting of the asset, changing the historic rural setting of the asset by adding a visual barrier into an otherwise open rural landscape. This would cause a medium magnitude of impact and result in a moderate adverse effect.
- 9.4.23 Yewtree Farmhouse, Sunbank Lane, Halebank (NHLE 1356625) is a Grade II listed building of moderate value. The asset is located within 50m of the land required for the construction of Proposed Scheme. The 18th century farmhouse is set within the rural hamlet of Halebank. Halebank was formerly a small rural hamlet, which dated to at least the late post-medieval period but is now located within 100m of the M56 and near Manchester Airport. However, the rolling topography and local mature planting allows the hamlet as a whole to retain its historic rural character. Construction would involve the demolition of a number of properties within the hamlet of Halebank. The asset would be impacted by the diversion of Sunbank Lane to the south and the creation of the large Halebank cutting through the hamlet (within 50m of the asset). This would significantly alter the topography and historic context of the hamlet and asset, altering how the asset is appreciated, and permanently changing the historic small rural settlement setting. This would cause a medium magnitude of impact and a result in a moderate adverse effect.

Other mitigation measures

- 9.4.24 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

- 9.4.25 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.
- 9.4.26 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-o6 Map Series within the Volume 2: MAo6 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:

- Mere Covert Cottage (NHLE 1329668);
- Sycamore Cottage (NHLE 1139583);
- Church of St Elizabeth (NHLEE 1139584);
- Hough Green Farmhouse (NHLE 1229540);
- Lower House Farmhouse, Ashley (NHLE 1139588); and
- Yewtree Farmhouse, Sunbank Lane, Halebank (NHLE 1356625).

Other mitigation measures

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

Summary of likely residual significant effects

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

Monitoring

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

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

10 Land quality

10.1 Introduction

10.1.1 This section of the report presents the baseline conditions that exist along route of the Proposed Scheme in the Hulseheath to Manchester Airport 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 brine 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, Cheshire East Council (CEC), Manchester City Council (MCC), Trafford Metropolitan Borough Council (TMBC), Greater Manchester Combined Authority (GMCA), the Environment Agency, Fera Science Ltd (FSL)⁷⁴ 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 are provided in the Volume 2: MAo6 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)⁷⁵.

10.2.2 In accordance with the SMR, a risk based approach was undertaken to identify contamination that may have an impact upon the construction of the Proposed Scheme. To support this, a desk based assessment has been undertaken for the study area, defined as the land required for construction of the Proposed

⁷⁴ Formerly known as the Food and Environment Research Agency

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

Scheme plus a 250m buffer. 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 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 resources⁷⁶ 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 have been collected from a range of sources including: Ordnance Survey mapping, the BGS, the Environment Agency, Coal Authority, Oil and Gas Authority (OGA), Public Health England (PHE), CEC, Natural England, FSL, Ministry of Defence, Network Rail, petroleum officers and the APHA records in

⁷⁶ Defined in the SMR as 'mineral body including aggregates, salt, coal and other hydrocarbons, Petroleum Extraction Development Licences (PEDLs), Shale Prospective Areas (SPAs)'

addition to internet sources such as local geological trusts and publicly available minerals plans.

Geology

- 10.3.2 This section describes the underlying ground conditions within the Hulseheath to Manchester Airport area. Recent changes in lithostratigraphic classifications by the BGS have been incorporated where appropriate⁷⁷.
- 10.3.3 Table 14 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 14: Summary of the geology underlying land quality study area

Geology	Distribution	Formation description	Aquifer classification
Made ground			
Made ground	No artificial ground is present on geological mapping, but will be associated with landfilling activities and may be present in areas with previous development	Artificial ground comprising variable deposits of reworked natural and man-made materials	Not classified
Superficial			
Alluvium	Along the valleys of Agden Brook, Birkin Brook and along the River Bollin and within Rostherne Mere	Organic rich clay, silt, sand and gravel	Secondary A
Shirdley Hill Sand Formation	Located at the north-western extent of the study area at Arthill, between Agden Brook and River Bollin	Sand	Secondary A
Glaciofluvial sheet deposits	Present surrounding the alluvium along the Agden Brook, Birkin Brook and River Bollin	Sand and gravel	Secondary A
Glacial till	Located across the majority of the study area where other superficial deposits not described	Sandy silty clay with gravel	Secondary (Undifferentiated)
Bedrock			
Mercia Mudstone Group - Sidmouth Mudstone Formation - Bollin Mudstone Member	Located across the majority of the study area	Mudstone and siltstone	Secondary B
Mercia Mudstone Group - Tarporley Siltstone Formation	Underlying the study area from the south of this area to the Agden Brook. Also present in a 350m wide strip where the route of the Proposed	Siltstone, mudstone and sandstone	Secondary B

⁷⁷ 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>.

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	Scheme would intersect the Mid-Cheshire line at Ashley		
Sherwood Sandstone Group - Helsby Sandstone Formation	Underlying the study area from Agden Brook to approximately 80m north-east of Millington Lane	Pebbly sandstone	Principal

Made ground

- 10.3.4 Made ground is a term used to denote man-made deposits such as landfill, spoil heaps or earthworks associated with construction or ground improvement. Such deposits may be poorly mapped and are often very variable in composition. Minor deposits of made ground may be encountered within this area, for example where ponds, sand or marl pits have been backfilled. There is evidence of historical landfilling within the study area, which may comprise greater deposits of made ground.
- 10.3.5 Made ground is not shown in the study area on the BGS artificial ground mapping⁷⁸. However, although not recorded, localised deposits of made ground are likely to be present between Warburton Green and Manchester Airport from previous development.
- 10.3.6 No known farm burial or pyre sites associated with the 2001 outbreak of foot and mouth disease (FMD) are known to be present within the Hulseheath to Manchester Airport area. In all cases, publicly available records (including APHA Foot and Mouth Disease County Status Maps)⁷⁹ do not provide an 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.

Superficial geology

- 10.3.7 The majority of the Hulseheath to Manchester Airport area is underlain by glacial till⁸⁰ (Devensian). These deposits comprise poorly sorted sandy, silty clay. Where glacial till is not mapped, the following superficial deposits are identified.
- 10.3.8 Alluvium, which variably comprises silty clay, silt, sand and gravel, are mapped along the following watercourses: Agden Brook, Birkin Brook and the River Bollin. Another area of alluvium is mapped underlying Rostherne Mere, and extends into the study area to the north of the Mere.
- 10.3.9 Glaciofluvial sheet deposits comprising sand and gravel are present surrounding the alluvium along the Agden Brook, Birkin Brook and to a lesser extent in the valley of the River Bollin.

⁷⁸ British Geological Survey 1:10,000 Artificial ground mapping

⁷⁹ Animal and Plant Health Agency (2001) Foot and Mouth Disease 2001 - County Status Maps. Available at <https://data.gov.uk/dataset/1c7ae62d-3268-467d-a2df-e8c5a6d93ab3/foot-and-mouth-disease-2001-county-status-map-29-10-2001>

⁸⁰ 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.

10.3.10 An area of Shirdley Hill Sand Formation, comprising sand, is present at the north-western extent of the study area to the west of Spodegreen Farm.

Bedrock geology

10.3.11 The bedrock geology in the study area mainly comprises the Bollin Mudstone Member of the Mercia Mudstone Group. It is typically described as mudstone and siltstone with some halite-bearing units and sandstone. Where the Bollin Mudstone Member is not recorded, the following bedrock geology is indicated:

- the Tarporley Siltstone Formation (Mercia Mudstone Group) is present from the start of the area to Agden Brook, and where the route of the Proposed Scheme would intersect the Mid-Cheshire line at Ashley; and
- a small area of Helsby Sandstone Formation (Sherwood Sandstone Group) is present from Agden Brook to an area north-east of Millington Lane.

10.3.12 The boundaries between the Helsby Sandstone Formation, Bollin Mudstone Member and the Tarporley Siltstone Formation are marked by faults.

Radon

10.3.13 Radon is a radioactive gas formed by the radioactive decay of naturally occurring uranium in rocks and soils. The occurrence of radon gas is shown in the BGS Radon Potential Dataset⁸¹.

10.3.14 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/m³), as defined by Public Health England's UK Radon online map, therefore radon will not be considered further.

Groundwater

10.3.15 Four categories of aquifer have been identified within the study area, as defined by the Environment Agency:

- the Sherwood Sandstone Group is designated as a Principal aquifer;
- the alluvium and the glaciofluvial sheet deposits are designated as Secondary A aquifers;
- the Mercia Mudstone Group, which underlies the majority of the study area, has been designated as a Secondary B aquifer; and
- the glacial till is designated as a Secondary (Undifferentiated) aquifer.

⁸¹ 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.

- 10.3.16 The Environment Agency reports that there are no groundwater abstraction licences located within the study area. There are also no private groundwater abstraction licenses registered within the study area.
- 10.3.17 There are no groundwater source protections zones (SPZ)⁸² identified within the study area.
- 10.3.18 According to the Environment Agency, there are no drinking water safeguard zones⁸³ for groundwater within the study area.
- 10.3.19 Details of the licensed abstractions are provided in Section 15, Water resources and flood risk. It should be noted that all abstractions that are used directly or indirectly for human consumption are by default designated as SPZ. In such cases the abstraction point qualifies for a default 10m radius for SPZ1 and a default 250m radius for SPZ2. There is no default SPZ3 for total catchment with respect to this type of abstraction.
- 10.3.20 Further information on the groundwater in the Hulseheath to Manchester Airport area is provided in Section 15, Water resources and flood risk.

Surface water

- 10.3.21 The Proposed Scheme would cross the following main rivers: Millington Clough and Agden Brook to the north of Hulseheath, Blackburn's Brook and Birkin Brook to the south-east of junction 7 of the M56, the River Bollin to the north-east of Thorns Green, Timperley Brook to the south of Davenport Green and Fairywell Brook on the boundary between Trafford and Manchester.
- 10.3.22 The following main rivers and watercourses are also in the study area: tributaries of Birkin Brook, tributaries of the River Bollin and a tributary of Timperley Brook. Rostherne Mere, a lake, is also present in the study area.
- 10.3.23 A number of unnamed streams, tributaries, drains, ponds and culverts are also located within the study area.
- 10.3.24 Surface water bodies in the Hulseheath to Manchester Airport area are described in more detail in Section 15, Water resources and flood risk.
- 10.3.25 There are no licensed surface water abstractions located within the study area. No private water supplies from surface water sources have been identified within the study area.
- 10.3.26 According to Environment Agency records, there are no drinking water safeguard zones for surface water within the study area.

⁸² A groundwater SPZ is a defined area within which groundwater is extracted for potable water supply. The area is defined by the Environment Agency on the basis of the length of time taken for groundwater to migrate to the potable source

⁸³ Environment Agency (2017) Drinking Water Safeguarding Zones mapping. Available at: <https://environment-agency.cloud.esriuk.com/farmers/>

Current and historical land use

- 10.3.27 Current potentially contaminative land uses within the study area include a total of 41 identified sites. The key potentially contaminative sites are: Manchester Airport, and two depots.
- 10.3.28 Historical land uses identified within the study area with the potential to have caused contamination include four mining sites and 14 other identified potentially contaminative 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: brick and tile works; a depot and a smithy⁸⁴.
- 10.3.29 There are no landfills in the study area.
- 10.3.30 Further details of key current and historical contaminative land uses within the study area are shown in Table 15 and Table 16.

Table 15: Current and historical mining, mineral sites and colliery spoil sites located in the study area

Name and area reference	Location	Description
Quarry near Boothbank Lane (MA06-04)	South of Booth Bank, 2m from to the land required for the Proposed Scheme	Historical quarry with crane, present on mapping between 1876 and 1898
Gravel pit near Boothbank Lane (MA06-05)	South-west of Booth Bank, 1m from the land required for the Proposed Scheme	Historical gravel pit (also marked as a sand pit), approximately 2.8ha, present on mapping between 1878 and 1938
Brick fields on Cherry Tree Lane and Mobberley Road (MA06-34, MA06-52)	North of Rostherne Mere, within the land required for the Proposed Scheme South of Ashley, within the land required for the Proposed Scheme	Historical brickfield, approximately 0.7ha, present on mapping between 1898 and 1910. Now open land Historical brickfield, approximately 0.9ha likely associated with nearby brick and tile works (MA06-53), present on mapping between 1882 and 1954

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

Name and area reference	Location	Description
Brick and tile works, Mobberley Road (MA06-53)	South of Ashley, within the land required for the construction of the Proposed Scheme	Historical brick and tile works with kiln, present on mapping between 1882 and 1909. Since partially infilled and now undeveloped open land with ponds
Manchester Airport (MA06-110)	South-east of Davenport Green. In the study area, approximately 50m from land required for the construction of the Proposed Scheme	The airport opened in 1938, but only increased in size in the 1990s when Terminal 2 and the associated aircraft apron was constructed
Depots (MA06-92, MA06-101, MA06-109)	In Warburton Green, 190m from the land required for the construction of the Proposed Scheme Off junction 6 of the M56, 10m from the land required for the	Historical depot, marked on mapping since 1975-1995. Since redeveloped into residential housing Active depot, marked on mapping since 1975

⁸⁴ Commonly used term on historical mapping to denote a blacksmiths.

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Name and area reference	Location	Description
	construction of the Proposed Scheme North of junction 6 of the M56, 2m from the land required for the construction of the Proposed Scheme	Historical depot, marked on mapping since 1975-1995. Currently a car park
Smithy, Ashley (MAo6-58)	In Ashley, 190m from the land required for the construction of the Proposed Scheme	Historical smithy, present on mapping between 1882 and 1992. Currently a vacant building
Rail land (MAo6-54)	South of Ashley, within the land required for the construction of the Proposed Scheme	Existing Mid-Cheshire line

10.3.31 Contaminants commonly associated with sites in Table 15 and Table 16 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

- 10.3.32 The regulatory data reviewed included pollution incidents (major, significant and minor categories), radioactive and hazardous substances consents and environmental permits (previously landfill, integrated pollution control and integrated pollution prevention and control licences).
- 10.3.33 There are no Control of Major Accident Hazards (COMAH) sites in the study area.
- 10.3.34 There are no recorded major, significant and minor incidents in the Hulseheath to Manchester Airport area.
- 10.3.35 The Environment Agency reports that there are no consented discharges to groundwater within the study area. Further details on the groundwater in the Hulseheath to Manchester Airport area can be found in Section 15, Water resources and flood risk.
- 10.3.36 There are 11 discharge consents to surface water within the study area, none of which are within the area of land required for the construction of the Proposed Scheme.
- 10.3.37 There are important ecological designations, as defined in the land quality section of the SMR75, located within the study area. These are summarised as:
- Rostherne Mere: a (SSSI), National Nature Reserve (NNR) and Ramsar site, located outside the land required for the construction of the Proposed Scheme, to the south of junction 8 of the M56;

- eleven local wildlife sites (LWS): including seven located within the land required for the Proposed Scheme and four others outside of the land required for the construction of the Proposed Scheme; and
- six Ancient Woodland Inventory Sites (AWIS): including Hancocks Bank AWIS located within the land required for the Proposed Scheme, and five others located outside the land required for the construction of the Proposed Scheme.

10.3.38 Further information on ecology can be found in Section 7, Ecology and biodiversity.

Mining/mineral resources

10.3.39 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 minerals plans and by the Coal Authority, as well as other forms of petroleum hydrocarbons such as shale gas and oil which are regulated by the Oil & Gas Authority (OGA) via the issue of Petroleum Exploration Development Licences (PEDLs).

Minerals plans

10.3.40 Cheshire County Council was responsible for the overall minerals and waste local plans for the study area. The Cheshire Replacement Minerals Local Plan⁸⁵ was adopted in June 1999 and sets out the policies aimed at controlling mineral related developments within the CEC and Cheshire West and Chester Council (CWCC) up to the year 2006. No further revisions of the plan were published by Cheshire County Council prior to its dissolution in 2009. No replacement plans have been published by CEC to date.

10.3.41 The GMCA is responsible for the minerals local plan in the Districts of Trafford and Manchester. The adopted minerals plan was published in April 2013⁸⁶.

10.3.42 The Cheshire Mineral Resource Information map⁸⁷ and Greater Manchester Minerals Plan present the extent of all mineral extraction planning permissions and brinefields. However, no such mineral extraction sites are recorded within the study area.

10.3.43 The location of mineral and mining resources within the study are described below.

Sand, gravel and clay deposits

10.3.44 A large sand and gravel mineral safeguarding area (MSA) would be intersected by the route of the Proposed Scheme at Booth Bank, again to the east of junction 7 of the M56, and at Halebank. Additionally, the eastern extent of a

⁸⁵ Cheshire County Council (1999) *The Cheshire Replacement Minerals Local Plan*

⁸⁶ MWPU (2013) *The Greater Manchester Joint Minerals Plan*

⁸⁷ Norton, GE et al (2006) *Mineral Resources Information for National, Regional and Local Planning: Cheshire (comprising Cheshire and the Boroughs of Halton and Warrington)*. British Geological Survey Commissioned Report CR/05/090N

sand and gravel MSA is present in the study area in Hale Barns, approximately 200m from land required for the construction of the Proposed Scheme.

10.3.45 Mineral sites between Hulseheath and Ashley are also noted within the study area, extracting aggregate from glaciofluvial sheet deposits and glacial till.

10.3.46 There are also recorded historical opencast quarries in the study area, extracting common clay and shale from the glacial till, and sand from glaciofluvial sheet deposits.

Salt deposits

10.3.47 An area of the extensive Cheshire MSA for salt extends into the study area at Rostherne Mere but will not exist beneath the route of the Proposed Scheme.

10.3.48 Areas of natural dissolution of the salt rockhead are unlikely be present in the study area and would be limited to areas where soluble rocks are present.

10.3.49 The study area from the start of the route of the Proposed Scheme to where the route of the Proposed Scheme would cross Hale Road in Hale Barns is located in a brine compensation area which indicates there is the potential for subsidence resulting from the historical pumping of brine.

Coal mining

Open cast coal mining

10.3.50 Shallow coal (located at less than 50m depth) is not recorded as a resource in the study area, and therefore, there is no known open cast coal mining in the study area.

Deep coal mining

10.3.51 Deep coal (located at more than 1,200m depth) is recorded as a resource in the study area.

10.3.52 Available records from the Coal Authority show that the route of the Proposed Scheme would not be located in areas of recorded current or historical underground coal mining activities.

PEDLs/Hydrocarbons

10.3.53 The OGA indicates that the route of the Proposed Scheme passes through PEDL296 and a shale prospective area. The PEDL area is associated with extraction wells for conventional oil and gas. However, none of the extraction wells associated with the PEDL are located in the study area.

Geo-conservation resources

10.3.54 The following geo-conservation resources have been identified within the study area: Rostherne Mere geological SSSI, located 10m to the south of land required for the construction of the Proposed Scheme.

Receptors

10.3.55 The sensitive receptors that have been identified within the study area are summarised in Table 17. A definition of receptor sensitivity is given in the SMR.

Table 17: Summary of sensitive receptors

Issue	Receptor type	Receptor description	Receptor sensitivity
Land contamination	People	Residents of existing properties, nurseries, schools, study centres, play areas, parks and public open space	High
		Employees and visitors at commercial areas, retail parks and areas, hotels	Moderate
		Workers at and visitors to industrial premises	Low
	Groundwater	Principal aquifer (Sherwood Sandstone Group)	High
		Secondary A aquifers (alluvium and glaciofluvial sheet deposits)	Moderate
		Secondary (undifferentiated) aquifer (glacial till), Secondary B aquifer (Mercia Mudstone Group)	Low
	Surface waters	River Bollin, Blackburn's Brook and Birkin Brook	High
		Timperley Brook	Moderate
		Other tributaries and unnamed watercourses	Low
	Ecological designations	SSSI, NNR, Ramsar (all Rostherne Mere),	High
		AWIS and LWS	Moderate
	Built environment	Underground structures and buried services	Low
Impacts on mining/mineral and petroleum (gas) sites (severance and sterilisation)	Mining/mineral sites	Clay, shale and aggregate resources, salt MSA, sand and gravel MSA, PEDL and shale prospective area	Moderate
Geodiversity	Geological resources	Rostherne Mere Geological SSSI	High

10.4 Effects arising during construction

Avoidance and mitigation measures

10.4.1 The construction assessment takes into account the mitigation measures described in the draft Code of Construction Practice (CoCP)⁸⁸. The draft CoCP sets out the measures and standards of work that would be applied to the

⁸⁸ Supporting document: Draft Code of Construction Practice

construction of the Proposed Scheme and includes requirements to ensure the effective management and control of work in contaminated areas.

- 10.4.2 The requirements in the draft CoCP relating to work in contaminated areas would ensure the effective management and control of the work. These requirements include:
- methods to control noise, waste, dust, odour, gases and vapours (Sections 5, 7, 11, 13, 14 and 15);
 - methods to control spillage and prevent contamination of adjacent areas (Section 5, 11 and 16);
 - the management of human exposure for both construction workers and people living and working nearby (Section 5, 7, 11, 13 and 14);
 - methods for the storage and handling of excavated materials (both contaminated and uncontaminated) (Sections 6, 7, 11 and 15);
 - management of any unexpected contamination found during construction (Section 11 and 15);
 - a post-remediation permit to work system (Section 11);
 - storage requirements for hazardous substances such as oil (Section 5, 11 and 16);
 - traffic management to ensure that there is a network of designated site haul routes to reduce compaction/degradation of soils (Section 5, 6 and 14);
 - methods to monitor and manage flood risk and other extreme weather events which may affect land quality during construction (Section 5 and 16); and
 - methods to manage discovery of unknown animal burial pits (Section 6).
- 10.4.3 The draft CoCP would require that prior to and during construction, a programme of further detailed investigations, which may include both desk based and site based work, takes place in order to confirm the full extent of areas of contamination. It also requires a risk assessment to be undertaken to determine what, if any, site specific remediation measures are required to allow the Proposed Scheme to be constructed safely and to prevent harmful future migration of contaminants. The investigation and assessment of potentially contaminated sites would be undertaken in accordance with Environment Agency CLR11⁸⁹ and British Standards BS10175⁹⁰ and BS8576⁹¹.
- 10.4.4 Where significant contamination is encountered, a remedial options appraisal would be undertaken to define the most appropriate remediation techniques.

⁸⁹ Environment Agency, (2004), *CLR11 Model Procedures for the Management of Land Contamination*

⁹⁰ British Standard, (2011), *BS10175+A2:2017 Investigation of Potentially Contaminated Sites*

⁹¹ British Standard, (2013) *BS8576 Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)*

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 UK⁹². The preferred option would then be developed into a remediation strategy.

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

Assessment of impacts and effects

- 10.4.6 Construction of the Proposed Scheme in this area would require earthworks, utility diversions, deep foundations, grouting, 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: MAo6 Map Book.

Land contamination

- 10.4.7 In line with the assessment methodology, as set out in the SMR, an initial screening process has been undertaken to identify areas of current or historical contaminative use within the study area and to consider which of these areas might pose contaminative risks for the Proposed Scheme. Sites that present a low risk have not been taken further in the assessment. Any moderate to higher risk sites have been taken forward to more detailed risk assessments, in which the potential risks are assessed more fully. The majority of the areas that have undergone the more detailed risk assessments are historical or current landfills, industrial, commercial and mining sites.
- 10.4.8 CSMs have been produced for those areas taken to detailed risk assessments. The following factors determine the need for detailed risk assessments:
- whether the site is located on or off the route of the Proposed Scheme or associated off line works;
 - the vertical profile of the route;
 - the presence of underlying sensitive groundwater aquifers (Principal or Secondary A) or nearby watercourses; and
 - the presence of adjacent residential properties or sensitive ecological receptors.

⁹² Sustainable Remediation Forum UK, (2010), *A Framework for Assessing the Sustainability of Soil and Groundwater Remediation*

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- 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 18. The potential impacts and baseline risks quoted are those before any mitigation is applied. The assessed baseline risk is based on the information provided at the time of the assessment. Where limited information is available, the assessment is based on precautionary, worst case assumptions and may therefore report a higher risk than that which actually exists. A screening assessment of the effects of contamination has been completed by comparing the detailed CSM developed for potential contaminated areas at baseline with construction and post-construction stages.

Table 18: Summary of baseline CSM for sites which may pose a contaminative risk for the Proposed Scheme

Area reference	Area name ⁹⁴	Human health risk	Ground water risk	Surface water risk	Ecosystem risk	Buildings risk
On site ⁹⁵						
MAo6-54	Rail land	Very low to moderate/low	Moderate/low	Low	N/A ⁹⁶	Very low
MAo6-105/ MAo6-109	Depot and small sub-station	Very low to moderate/low	Moderate/low	N/A	N/A	Low
MAo6-103/ MAo6-104	Tanks, likely for fuel storage	Very low to moderate/low	Moderate/low	N/A	N/A	Low
MAo6-05/ MAo6-18/ MAo6-19/ MAo6-82/ MAo6-84/ MAo6-90/ MAo6-94/ MAo6-95	Infilled ground, including; ponds, pits, brickfields and quarries	Very low to moderate/low	Moderate/low	Low	N/A	Very low to moderate/low
MAo6-02/ MAo6-17/ MAo6-27/ MAo6-29/ MAo6-83/ MAo6-86/ MAo6-87/ MAo6-88/ MAo6-89	Farms, including tanks	Very low to moderate/low	Moderate/low	Moderate/low	Moderate/low	Low

⁹³ Each potentially contaminated site is allocated a unique reference number

⁹⁴ On site is within the area of land required for construction of the Proposed Scheme. Off site is the land beyond this and up to 250m

⁹⁵ 'On site' is within the area of land required for construction of the Proposed Scheme

⁹⁶ Risks are deemed to be not applicable when the pollutant linkage is not considered to exist between the source and receptor, for example due to distance

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Area reference ⁹³	Area name ⁹⁴	Human health risk	Ground water risk	Surface water risk	Ecosystem risk	Buildings risk
MAo6-61/ MAo6-81	Marshland	Very low to moderate/low	N/A	N/A	N/A	Very low
Off site ⁹⁷						
MAo6-92	Depot	Very low to low	Very low	N/A	N/A	Low
MAo6-110	Airport	Very low to moderate/low	Moderate/low	Moderate/low	N/A	Very low
MAo6-06/ MAo6-09/ MAo6-23/ MAo6-41/ MAo6-42/ MAo6-100/ MAo6-116	Farms, including tanks	Very low to moderate/low	Moderate/low	Moderate/low	N/A	Low
MAo6-30	Marshland	Very low to moderate/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.
- 10.4.14 All of the sites set out in Table 18 have been assessed for the change in impact associated with the construction stage of the work and were found to have non-significant (neutral) effects.

⁹⁷ 'Off site' is beyond the land required for construction of the Proposed Scheme but within 250m of it

- 10.4.15 In the event that unexpected contamination is encountered during the construction of the route in this area, this would be remediated as described in the draft CoCP resulting in an overall beneficial effect.
- 10.4.16 Construction compounds located in this study area would include the storage of potentially hazardous substances, such as fuels and lubricating oils and may also be used for temporary storage of potentially contaminated soils. Mitigation measures set out within the draft CoCP include management of risks from the storage of such materials, resulting in no significant effects.

Permanent effects

- 10.4.17 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.
- 10.4.18 The magnitude of the permanent effects and their significance have been determined by assessing the change in risk between the main baseline risk and the main post-construction risk. Therefore, where there is no change between the main baseline risk and the main post-construction risk, the permanent effect significance is deemed to be negligible even if the risk is assessed to remain as high. This would be the case where the construction of the Proposed Scheme does not alter the risks from an existing potentially contaminated site that is outside the construction boundary. A worsening would result in negative effects and an improvement would result in positive effects.
- 10.4.19 All of the sites set out in Table 18 have been assessed for the change in impact associated with the permanent post construction stage of the work. Table 19 presents the summary of the resulting construction permanent effects that have been found to be significant. All other sites referenced in Table 19 were found to have non-significant (either neutral or minor beneficial) effects.

Table 19: Summary of permanent (post-construction) effects

Name and area ref	Receptor	Main baseline risk range	Main post-construction risk range	Post-construction effect
On-site farms, including tanks MAo6-02/MAo6-17/MAo6-27/ MAo6-29/MAo6-83/MAo6-86/ MAo6-87/MAo6-88/MAo6-89	Controlled waters – groundwater (Principal aquifer in Helsby Sandstone Formation)	Moderate/low	Very low	Moderate beneficial (Significant)

- 10.4.20 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 would be controlled to an acceptable level.

Mining/mineral resources

- 10.4.21 Construction of the Proposed Scheme has the potential to affect existing mineral resources and proposed areas of mineral exploitation. This could occur by sterilisation of the resource through direct excavation during construction of the Proposed Scheme or through temporary and/or permanent severance⁹⁸ or isolation that may occur during the construction phase of the Proposed Scheme, possibly continuing through to its operation.
- 10.4.22 The Proposed Scheme would intersect an extensive aggregate mineral site between Hulseheath and Ashley, according to data provided by CEC.
- 10.4.23 Sand and gravel MSA would be crossed by the route of the Proposed Scheme at Booth Back, to the east of junction 7 of the M56 and at Halebank. Another area is located in the study area at Hale Barns. There is also a salt MSA within the study area near Rostherne Mere, however, this does not fall within the land required for the construction of the Proposed Scheme.

Temporary effects

- 10.4.24 There are no identified shallow coal resources in the study area, therefore, there would be no temporary effects from the construction of the Proposed Scheme on this resource.

Sand, gravel and clay deposits

- 10.4.25 Temporary adverse effects may occur where construction compounds are proposed within mineral safeguarding areas. 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.
- 10.4.26 The following compounds would be located within the MSA:
- Agden Brook viaduct satellite construction compound;
 - Millington Lane satellite construction compound;
 - Blackburn's Brook viaduct satellite construction compound;
 - Birkin Brook viaduct satellite construction compound;
 - A556 Chester Road satellite construction compound; and
 - River Bollin East viaduct satellite construction compound.

Salt deposits

- 10.4.27 The effect of construction of the Proposed Scheme on the identified salt deposits would be negligible as the identified salt deposits are not underlying areas required for the construction of the Proposed Scheme.

⁹⁸ In this context, severance refers to the Proposed Scheme splitting an actual or proposed mining/mineral site into two or more areas, such that separate accesses would be required to work the whole site

Coal mining - deep

- 10.4.28 Deep coal at more than 1,200m depth is recorded as a resource in the study area, however, there are no identified deep coal mines, and therefore, there would be no effects from the Proposed Scheme.

Petroleum Exploration Development Areas (PEDLs)

- 10.4.29 The effect of construction of the Proposed Scheme on the identified PEDL 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. This is due to the large extent of the PEDL and the limited area of land that would restrict potential well locations.

Permanent effects

- 10.4.30 There are no identified shallow coal resources in the study area, therefore, there would be no permanent effects from the Proposed Scheme on this resource.

Sand and gravel deposits

- 10.4.31 The effects of construction of the Proposed Scheme on the aggregate mineral sites and sand and gravel MSA would be permanent where the MSA would underlie the footprint of the permanent works, with a strip of mineral becoming sterilised. As a proportion of the mineral site, this would be a loss of approximately 2.5% of the total area, and for the MSA, the strip would be less than 1% of the area. The effect on the mineral resources is considered to be minor, and therefore, not significant. Mitigation measures (if any) would be discussed in advance of the works.

Salt deposits

- 10.4.32 The effect of the Proposed Scheme on the identified salt deposits would be negligible as the identified salt deposits are not underlying areas required for the Proposed Scheme.

Coal mining - deep

- 10.4.33 Deep coal at more than 1,200m depth is recorded as a resource in the study area. However, there are no identified deep coal mines. The presence of the permanent works would have a negligible impact upon this low sensitivity receptor. Therefore, there would be no effects on deep coal resources as a result of the Proposed Scheme.

Petroleum Exploration Development Areas (PEDLs)

- 10.4.34 The effects of the Proposed Scheme on the identified PEDL would be negligible as it is unlikely that the Proposed Scheme would place a constraint on future exploitation of potential sources of shale gas or other forms of hydrocarbon resource. This is due to the large extent of the PEDL and the limited area of land that would restrict potential well locations.

- 10.4.35 Table 20 reports the assessment of permanent effects from construction on the mining and mineral resources identified.

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Table 20: Summary of effects for mining and mineral resources

Site name	Status	Description	Sensitivity/ value	Magnitude of impact	Effect and significance (Y/N)
Aggregate mineral sites, Hulseheath to Ashley	Mineral site	Multiple mineral sites in a cluster surrounding Rostherne Mere, within land required for the Proposed Scheme.	Medium	Minor	Negligible effect (N)
Sand and gravel MSA, Booth Bank, M56 and Halebank	MSA	Sand and gravel MSA defined by CEC. Within land required for the Proposed Scheme.	Medium	Minor	Negligible effect (N)
Sand and gravel MSA, Halebarns	MSA	Sand and gravel MSA defined by GMCA minerals plan, map 28. In the study area.	Medium	Negligible	Negligible effect (N)
Salt MSA	MSA	Salt MSA defined by CEC. In the study area.	Medium	Negligible	Negligible effect (N)
Deep coal	No designation	Deep coal at more than 1,200m.	Low	Negligible	Negligible effect (N)
PEDL296	PEDL	Petroleum exploration and development licence areas.	Medium	Negligible	Negligible effect (N)

10.4.36 There would be negligible effects on the mineral resources located in the study area, which are not significant.

Geo-conservation sites

10.4.37 Rostherne Mere, a geological SSSI, is located 5m to the south of land required for the construction of the Proposed Scheme. This has been classified as a site of high sensitivity. It is not located within the land required for the construction of the Proposed Scheme, therefore, any likely impacts would be negligible. The overall effect on this geo-conservation site would therefore be negligible, which is not significant.

Other mitigation measures

10.4.38 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.

10.4.39 Mitigation of the effects on mineral resources within the MSA could include extraction of the resource, for use within the Proposed Scheme.

Further extraction may be limited to 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 CEC and GMCA, and any other relevant parties to assist in achieving an effective management of minerals within the affected locations.

Summary of likely residual significant effects

- 10.4.40 Based on the information currently available and with the application of the mitigation measures set out 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 three auto-transformer stations; Tom Lane auto-transformer station located to the east of Tom Lane, Sunbank Lane auto-transformer station located off Chapel Lane, and Manchester Tunnel South Portal auto-transformer station located to the north of Thorley Lane. Auto-transformer 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 Hulseheath to Manchester Airport 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 National Trust and Cheshire East Council (CEC) has commenced. The purpose of this engagement has been to discuss the assessment methodology, extent of the landscape and visual study area, and the locations of visual assessment and verifiable photomontage viewpoints. Engagement will continue as part of the development of the Proposed Scheme and to inform the formal assessment.
- 11.1.4 The Volume 2: MAo6 Map Book shows the locations of key environmental features (Map Series CT-10) and the key construction (Map Series CT-05) and operational (Map Series CT-06) features of the Proposed Scheme. It also shows the locations of landscape and visual impact mitigation measures (Map Series CT-06), viewpoints that would potentially be significantly affected at the construction (Map Series LV-03) and operation (Map Series LV-04) phases and Landscape Character Areas (LCA) that would potentially be significantly affected at the construction and operation phases (Map Series LV-02). 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)⁹⁹.
- 11.2.2 Summer surveys for the landscape and visual assessment were undertaken from July 2017 and winter surveys were undertaken from February 2018 to inform the assessment. Further surveys will be undertaken to inform the assessment and will be 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

⁹⁹ Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

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.
- 11.2.7 The assessment of visual effects during construction covers the situation in winter at peak activity. The assessment of operational visual effects covers the situation in winter and summer of year 1 and summer of year 15. The assessment of landscape effects is undertaken for the construction phase and for the operational phase at both year 1 and year 15. The landscape assessment does not consider seasonal variations e.g. winter/summer, since these do not affect character. Likely significant landscape and visual effects for year 30 will be reported in the formal ES.
- 11.2.8 The assessment has been carried out on the basis that the station and surrounding public realm associated with the Proposed Scheme will be subject to a high quality architectural and landscape design.
- 11.2.9 The assessment has been carried out on the basis that design of structures would, insofar as reasonably practicable, integrate with existing skyline features and would make use of a simple, clean and coherent palette of materials to help structures fit in the landscape.
- 11.2.10 Professional judgements on landscape value are summarised in the baseline descriptions and judgements on landscape susceptibility and sensitivity are summarised as part of the assessment of effects on each significantly affected LCA. Full judgements on value, susceptibility and sensitivity will be provided in the formal ES.

11.3 Environmental baseline

Existing baseline

Landscape baseline

- 11.3.1 The study area includes the area between Hulseheath in the west, the urban edge of Greater Manchester in the north, Mobberley in the south and Manchester Airport in the east. Tree-lined water courses including the River Bollin, Blackburn's Brook, Birkin Brook and Timperley Brook have cut shallow valleys into an otherwise flat or gently undulating landscape. Around Ashley, the pattern of small scale fields, hedgerows and mature hedgerow oak trees is typical of the Cheshire Plain landscape, whereas the eastern and western parts of the area have a more wooded quality, with ancient woodland in Meremoss Wood, Harper's Bank Wood, Bong's Wood, Harpers Bank Wood, Hancock's Banks Wood, Warburton Wood, Sunbank Wood and along Blackburn's Brook. Davenportgreen Wood has recently been identified as Ancient Woodland. Other woodlands include Tableymoss Wood, Raleigh Wood and Square Wood. Estate woodland and a long boundary wall delineate the extent of Tatton Park. Natural water bodies known as meres are common in this area. These features, a large-scale example of which is Rostherne Mere, are the result of glacial processes and typical of the Cheshire landscape. Rostherne Mere lies in bowl-shaped valley, with wooded sides and it is consequently not apparent in the wider landscape.
- 11.3.2 Towards Manchester Airport, the character of the landscape changes, with the urban influences of the airport and South Hale, a large suburban area on the outskirts of Greater Manchester. Manchester Airport is surrounded by industrial and commercial development. South Hale is a low density, quiet residential suburb with wide, tree-lined streets and detached and semi-detached houses, set in substantial wooded gardens. Small settlements in the area, which generally retain a rural character despite their proximity to major roads and Greater Manchester, include Boothbank, Rostherne, Ashley, Thorns Green and Davenport Green.
- 11.3.3 Very few places are free from the sound of traffic noise: the M56, the M6, the A50, A538 Hale Road and the A556 Chester Road are all busy through roads and Manchester Airport generates noise and activity at ground level and in the sky above and trains on the Mid-Cheshire Line railway run through Ashley.
- 11.3.4 Historic features that contribute to the character of the landscape include Tatton Park, an important 18th century designed landscape (Grade II* on Historic England's Register of Historic Parks and Gardens), the Rostherne Conservation Area, which covers the estate village of Rostherne (part of the Tatton Estate) and the South Hale Conservation Area which covers part of the suburb of South Hale where there are examples of local architect Edgar Wood's late 19th and early 20th century housing.
- 11.3.5 The LCAs have been determined as part of an integrated process of environmental characterisation, informed by a review of historic landscape

mapping and the outcome from other topics including ecological assessments. These LCAs will be refined, as appropriate, upon review of available historic landscape characterisation data and will be included in the formal ES.

- 11.3.6 Use has been made of published landscape character assessments and a wide range of supporting GIS data, aerial photography and Ordnance Survey mapping, plus desk study and fieldwork. Landscape character assessments reviewed include the relevant National Landscape Character Areas¹⁰⁰, the Cheshire Landscape Character Assessment¹⁰¹ and the Trafford Metropolitan Borough Landscape Strategy¹⁰².
- 11.3.7 These published LCAs have been adapted for this assessment to provide LCAs of an appropriate and consistent scale. Minor amendments have also been made to some published LCA boundaries to reflect existing conditions.
- 11.3.8 For the purposes of this assessment, the Hulseheath to Manchester Airport area has been subdivided into six 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. Two of the six LCAs would not be significantly affected by the Proposed Scheme on account of the intervening vegetation, variable topography and urban form which would contain landscape effects to a relatively narrow corridor along the route of the Proposed Scheme. A summary of the remaining two LCAs that would be significantly affected within the Hulseheath to Manchester Airport area is provided in Table 21.

¹⁰⁰ 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>

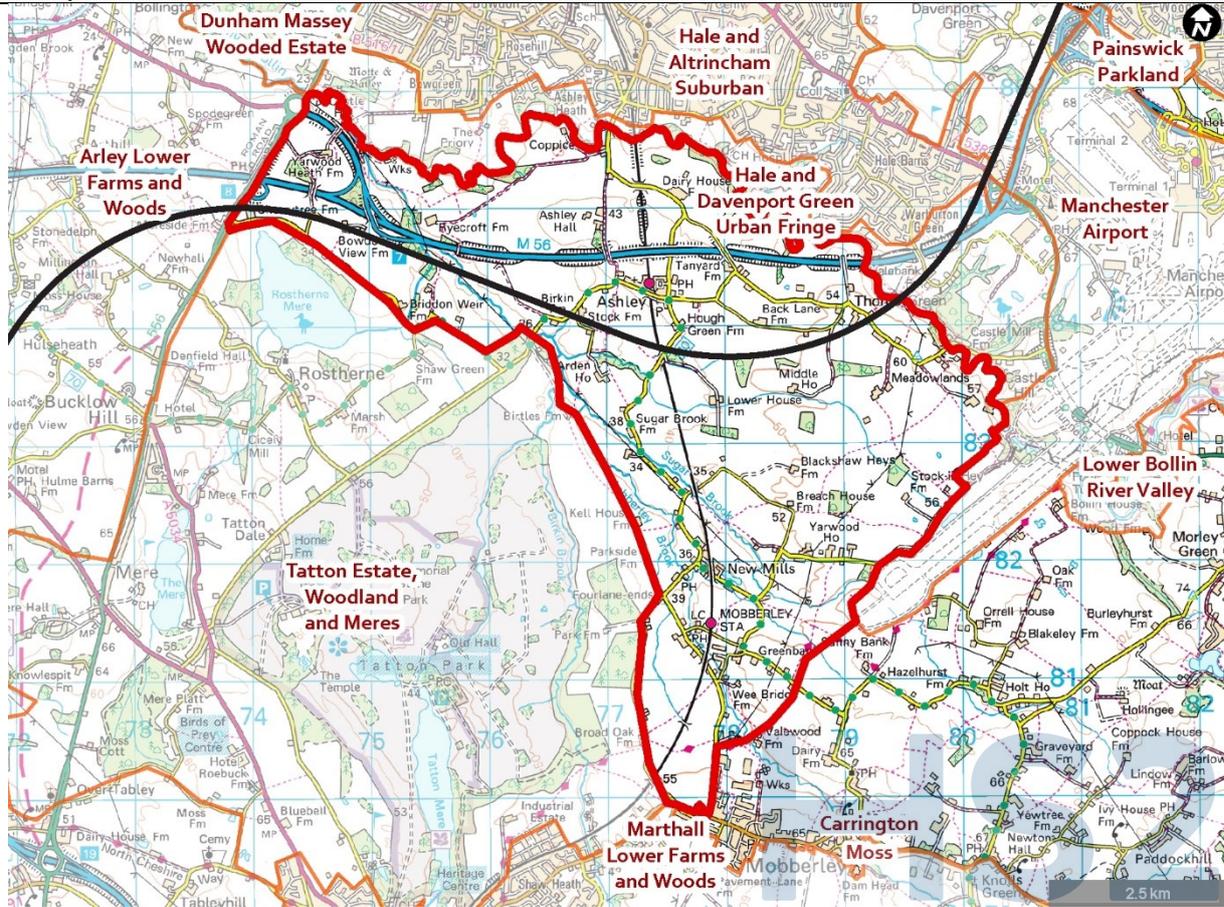
¹⁰¹ Cheshire County Council, Transport and Regeneration Service (2008), *Cheshire Landscape Character Assessment*. Available online at: http://www.cheshireeast.gov.uk/environment/heritage_natural_environment/landscape/landscape_character_assessment.aspx

¹⁰² Trafford Metropolitan Borough (2004), *Supplementary Planning Guidance Landscape Strategy*. Available online at: <https://www.trafford.gov.uk/planning/strategic-planning/docs/spg-2004-landscape-strategy.pdf>

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Table 21: Summary of significantly affected LCAs

Ashley Lower Farms and Woods



Fields and woodland belt south of Ashley



Fields and woodland belt south of Ashley



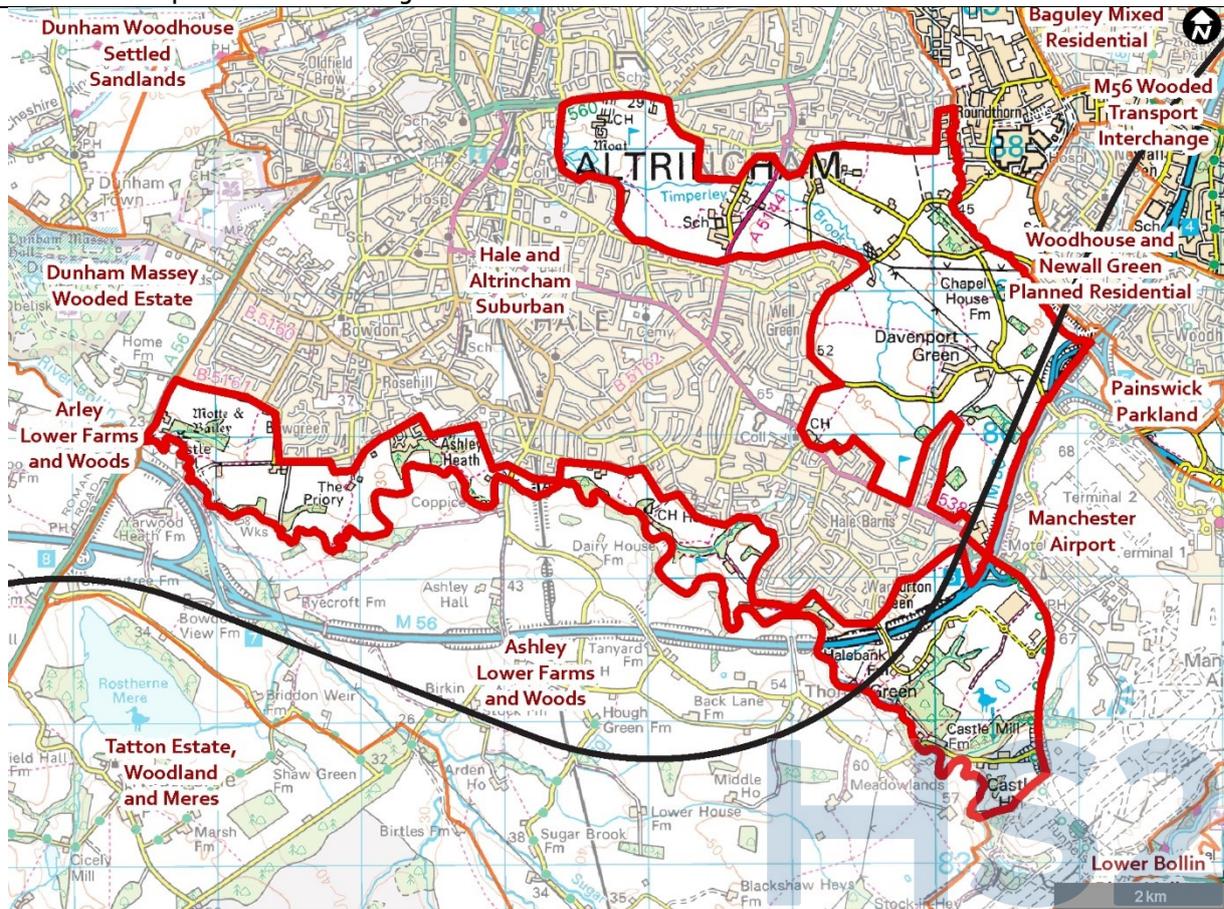
The Ashley Lower Farms and Woods LCA is a low lying, rural landscape used for arable and dairy farming. Narrow country lanes, hedgerow trees and tree-lined streams are characteristic of this area. The field system is mainly post-medieval, although there is an area of medieval enclosure east of Tatton¹⁰³. The field pattern is more intricate in the southern part of the LCA. Around Ashley and the M56 in the north, fields are larger and the character of the landscape feels less intimate. There is ancient woodland at Hancock's Bank. Small settlements include Ashley, Moberley, Morley, Morley Green, New Mills and Thorns Green. Farms and isolated, often historic, residential properties are found throughout the area. Farm buildings and pre-war residential properties are of red brick, with slate roofs. There are many fine mature

¹⁰³ Cheshire County Council, Transport and Regeneration Service (2008), *Cheshire Landscape Character Assessment*. Available online at: http://www.cheshireeast.gov.uk/environment/heritage_natural_environment/landscape/landscape_character_assessment.aspx

trees throughout the LCA, often around settlements. The southern runway of Manchester Airport extends into the centre of the LCA, but is well screened from the wider area and does not detract from its rural character.

There is an extensive and well-connected PRoW network in the LCA as well as two cycle routes: National Cycle Network Route 70 (running north-south through the centre of the LCA) and the Manchester Airport Orbital Cycleway (Regional Route 85 skirting Morley in the east). The North Cheshire Way links Knutsford to Wilmslow along Manchester Airport's southern runway. The Mid-Cheshire Line railway runs north-south through Ashley and Mobberley, the M56 through the northern part of the LCA and the A56 Chester Road through the western end of the LCA. The vehicle movements combining road traffic, trains and aircraft (taking off and landing at Manchester Airport) are a source of noise and activity, which reduce tranquillity throughout much of the LCA. Rural roads are narrow and tree-lined, but are often busy with through traffic. The night sky is darker away from the settlements which are lit at night. Overhead power lines are prominent in the eastern and western ends of the LCA. The intact pattern of hedgerows, the tree-lined streams and woodland belts means that much of the area has retained its rural character, despite the presence of transport infrastructure including Manchester Airport.

Hale and Davenport Green Urban Fringe



Pony grazing at Davenport Green by the M56



Medieval Davenport Green Hall



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The Hale and Davenport Green Urban Fringe LCA is a largely low-lying area wrapping around the edge of the Greater Manchester conurbation, partly following the valley of the River Bollin and abutting Manchester Airport. The River Bollin has carved a shallow valley along the southern boundary of the LCA apart from at Thorns Green, where the river runs through a steep sided, wooded valley, giving the area a shady, secluded quality. It is an area that has experienced much change associated with the expansion of the Greater Manchester conurbation and the airport. Despite this, there are remaining pockets of farmland comprising small to medium sized fields, surrounded by tree-lined hedgerows and woodland belts, which retain a rural character. The clay soils and high-water table feed the numerous streams and watercourses, including Timperley Brook (which rises under Manchester Airport). The LCA is well wooded with ancient woodland at Warburton Wood, Sunbank Wood and Davenportgreen Wood and woodland lining the River Bollin and the M56 corridor. The built form in the LCA is mainly residential, including Davenport Green, Hale Bank and individual farmhouses and dwellings. The timber framed 17th century Davenport Green Hall, in wooded grounds is listed (Grade II).

The PRoW network is sparse, but there is a long-distance footpath – the Bollin valley Way - along the River Bollin, which passes under the M56 and the footpath network in Sunbank Wood is well used. The motorway divides the LCA, reducing the possibilities for north-south movement by footpath or road. Recreational land uses include a golf course and a cricket ground, and are typical of the urban fringe. The M56 and Manchester Airport are sources of noise and activity, reducing tranquillity throughout much of the LCA. Rural roads are narrow and tree lined, but often busy with through traffic. The location on the edge of Greater Manchester and next to Manchester Airport, means that the night sky is not dark. The airport and the M56 detract from the remaining rural character of this area and development is apparent in almost all areas of the LCA. However, the area is valued for its recreational opportunities and the importance of its open areas and connections to the Cheshire countryside from Greater Manchester.

The overall value of this this LCA is low-medium based on the woodland, the River Bollin valley, pockets of farmland and the M56.

Visual baseline

- 11.3.9 A summary description of the distribution and types of receptors most likely to be affected is provided below. The viewpoints are numbered to identify their locations and are shown on the viewpoint location maps (see Volume 2: MAo6 Map Book, Map Series LV-03 and 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: Recreational¹⁰⁴, 4: Transport, 5: Hotels/healthcare/education and 6: Employment.
- 11.3.10 The landform of the Hulseheath to Manchester Airport area is flat or gently undulating, but there are few long views possible due to the screening effects of intervening development and vegetation including woodland, hedgerows along field boundaries and country lanes, hedgerow trees, planting along the M56, and domestic gardens. The terrain becomes steeper at Thorns Green and Hale Bank and along the tree-lined River Bollin valley, further limiting views. The landscape becomes more open north of Rostherne Mere, where there are larger fields and less intervening vegetation and the Pennines are visible in the distance.
- 11.3.11 Many views from settlements are filtered through existing trees and hedgerows, but where there is less intervening vegetation, such as north of Rostherne Mere, around Ashley and on the southern boundary of South Hale, longer views are possible.

¹⁰⁴ 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

- 11.3.12 Users of PRoW and other recreational paths tend to experience views restricted by hedgerows and trees, but there are more distant views possible where the landscape opens out, such as around Ashley, along the A556 Chester Road and north of Rostherne Mere. Views experienced by visitors to Tatton Park are mainly contained by the estate woodland, but there are longer views from the northern part of the deer park, towards Ashley.
- 11.3.13 Views experienced by road users in the area are generally limited by field boundary hedges and roadside vegetation.

11.4 Temporary effects arising during construction

- 11.4.1 As is commonplace with major infrastructure works, the scale of the construction activities means that works would be visible from many locations and would have the potential to give rise to significant temporary effects that cannot practicably be mitigated. Such effects are temporary and would vary over the construction period depending on the intensity and scale of the works at the time. The assessment of landscape and visual effects has been based on the activities occurring during the peak construction phase, which is defined as the period during which the main construction works would take place, including the presence of compounds, main earthworks and structure works.
- 11.4.2 The effects associated with the peak construction stage in this area are generally considered to be medium-term, based on the indicative construction programme in Section 2.3. It is currently anticipated that the civil engineering stage in this area would be undertaken between the end of 2024 and the start of 2030. Effects during other stages of works are likely to be less intensive due a reduced level 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)¹⁰⁵ to avoid or reduce landscape and visual effects, where reasonably practicable, during construction include the following: practicable, during construction include the following:
- avoidance of unnecessary tree and vegetation removal, and protection of existing trees in accordance with BS 5837: Trees in relation to design, demolition and construction¹⁰⁶;
 - 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;

¹⁰⁵ Supporting document: Draft Code of Construction Practice

¹⁰⁶ BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations, 2012, British Standard

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- 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; the construction of viaducts, embankments, the Manchester Airport High Speed Station, the Manchester Tunnel South portal, overbridges and underbridges; the removal of existing landscape elements including trees and hedgerows opening up new views; and the closure and diversion of existing public highways and PRoW.

Landscape assessment

11.4.7 Based on the current design it is anticipated that the LCAs set out in Table 22 would be significantly affected during construction of the Proposed Scheme.

Table 22: Summary description and judgement of effect for LCAs

<p>Ashley Lower Farms and Woods</p>	<p>Medium susceptibility and sensitivity</p>
<p>Susceptibility to change: the gently undulating topography, transport infrastructure, moderate degree of visual containment, intact pattern of hedgerows and hedgerow trees, and overall rural character impart a medium susceptibility to change arising from the Proposed Scheme.</p> <p>The north-western part of the LCA, north of Rostherne and around Ashley, would be directly affected by the introduction of construction activity and construction plant, including tower cranes, into a rural landscape. There would be large scale changes to the local landform as a result of the earthworks required to form the Rostherne embankment and cutting, the Blackburn’s Brook embankment and viaduct, the Rostherne embankment, the Ashley embankment, the Thorns Green cutting and the River Bollin South embankment. Substantial changes to the area would also result due to the construction of the Lamb Lane, Mobberley Road and Castle Mill Lane realignments, the Millington Footpath 7/2 and Back Lane accommodation overbridges and the temporary stockpiling of materials. The rural setting of Ashley would be particularly affected, with substantial areas of farmland south of the village occupied by construction works and the Mobberley Road North and South and Birkinheath Covert satellite compounds. There would be disruption to the PRoW network, with footpath diversions. Construction vehicle movements, construction activity and noise, which would reduce the tranquillity of the rural landscape (although traffic noise from the M56 is apparent across the northern part of the LCA). The large-scale of construction would introduce uncharacteristic features into the landscape, affecting a large area of the LCA.</p> <p>There would therefore be an overall high magnitude of change and major adverse effect.</p>	<p>Level of effect:</p> <p>Major adverse (significant).</p>

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Hale and Davenport Green Urban Fringe	Low-medium susceptibility and sensitivity
<p>Susceptibility to change: the mainly low-lying landform, woodlands, moderate degree of visual containment, transport infrastructure, tree-lined watercourses and rural-urban fringe character impart a low-medium susceptibility to change arising from the Proposed Scheme.</p> <p>The eastern end of the LCA, from the River Bollin to Davenport Green, would be directly affected by the introduction of construction activity and construction plant, including tower cranes, into a partly rural, partly urban fringe landscape. There would be large-scale changes to the local landform from the earthworks required to form the deep Halebank cutting and the Manchester Airport High Speed Station cutting and to construct the River Bollin East viaduct and the M56 East box structure under the motorway. Changes would also result from the demolition of hotels on Runger Lane and housing in Sunbank Lane, construction of Manchester Airport High Speed Station, the new A538 Hale Road and Thorley Lane overbridges, the Manchester Tunnel South portal and associated building and the airport station access road and from the temporary stockpiling of materials. The secluded quality of the River Bollin valley around Thorns Green would be particularly affected by the removal of woodland and the presence of the River Bollin East viaduct satellite compound. Tranquillity would be affected by construction vehicle and machinery movements and noise, although traffic noise from the M56 is apparent almost everywhere in the LCA. The large-scale of construction and the substantial areas occupied by construction compounds, would result in uncharacteristic changes which would affect the eastern part of the LCA.</p> <p>There would therefore be an overall medium magnitude of change and moderate adverse effect.</p>	<p>Level of effect:</p> <p>Moderate adverse (significant).</p>

Visual assessment

Introduction

- 11.4.8 Table 23 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 23 identifies the locations where the construction of the Proposed Scheme would potentially result in significant effects. Viewpoint locations are shown in Map Series LV-03 in the Volume 2: MAo6 Map Book.

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Table 23: Construction phase significant visual effects

<p>Views from Millington Hall, Booth Bank and PRoW Millington Footpaths 2/1, 4/1 and 5/1 (VPs 317-03-007, 317-02-010 and 318-02-003) Map Numbers: LV-03-317 and 318</p>	<p>High and medium-high sensitivity receptors</p>
<p>Residents and walkers on PRoW would experience substantial changes, some partially filtered through intervening vegetation, to near views as a result of the construction of the Peacock Lane East overbridge (in the MAo3 Pickmere to Agden and Hulseheath area), the Millington embankment, Agden Brook viaduct and the Millington Lane realignment and overbridge. The temporary site haul route along Millington Footpath 3/1 and south of Millington Hall would also be clearly visible. The large-scale features associated with construction including machinery, earthworks, temporary stockpiles and the Millington Lane and Agden Brook viaduct satellite construction compounds would be uncharacteristic of existing views of the wooded slopes of Millington Clough and the Agden Brook valley. The features would be in the direct frame of view from PRoW and most residential properties, although some views would be partially filtered. Vehicles using site haul routes would introduce uncharacteristic movement into views. The removal of trees and woodland from Millington Clough, the Agden Brook valley and Millington Lane would open up views of the Proposed Scheme from the surrounding area.</p> <p>There would therefore be an overall high magnitude of change and major adverse effect.</p>	<p>Level of effect: Major adverse (significant)</p>
<p>Views from Hope Cottage, Newhall Farm and nearby cottages, Mereside Cottage and Covert Cottage and PRoW Millington Footpaths 7/2, 8/1 and 11/1 and Rostherne Footpaths 2/1 and 4/1 (VPs 318-03-004, 329-02-001, 329-03-002, 329-02-004, 329-03-005, and 329-02-007) Map Numbers: LV-03-318 and 329</p>	<p>High and medium-high sensitivity receptors</p>
<p>Residents and walkers on PRoW would experience substantial changes, some partially filtered through intervening vegetation, to near and middle-distance views as a result of the construction of the Rostherne cutting, the Millington Lane realignment and the A556 Chester Road overbridge. The large-scale features associated with construction including machinery, earthworks, temporary stockpiles and the Millington Lane and A556 Chester Road satellite construction compounds would be uncharacteristic of existing views of the open fields and hedgerows. They would extend across the majority of the view for most PRoW users, but views from residential properties would be partially filtered by intervening vegetation. Temporary material stockpiles along both sides of the cutting would partially screen the works and as the excavation of the cutting deepens, visibility of the works would diminish.</p> <p>There would therefore be an overall high magnitude of change and major adverse effect</p>	<p>Level of effect: Major adverse (significant)</p>
<p>Construction would be visible in distant views from Rostherne Mere and PRoW Rostherne Footpath 2/1 (VP 329-03-005), but vehicles using the site haul route along Rostherne Lane and other country lanes would introduce uncharacteristic movement into views.</p> <p>There would therefore be an overall medium magnitude of change and moderate adverse effect</p>	<p>Level of effect: Moderate adverse (significant)</p>
<p>Views from Briddon Weir Farm, Birkin House and PRoW Rostherne Footpath 5/1 and Ashley Footpath FP3/1 (VPs 330-02-002, 330-03-003 and 330-03-005) Map Number: LV-03-330</p>	<p>High, medium-high and medium sensitivity receptors</p>
<p>Residents and walkers on PRoW Rostherne Footpath 5/1 and Ashley Footpath 3/1 would experience substantial changes, some partially filtered through or screened by intervening vegetation, to near and middle-distance views due to the construction of Blackburn's Brook viaduct and the Blackburn's Brook and Rostherne embankments. The large-scale features associated with construction including machinery, earthworks, temporary stockpiles and the Blackburn's Brook viaduct and Birkin Brook viaduct satellite construction compounds would be uncharacteristic of existing views of the wooded valley of the Birkin and Blackburn's brooks.</p>	<p>Level of effect: Major adverse (significant)</p>

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<p>Although the M56 is close to the construction corridor in this location it is in cutting and screened from the south by woodland, so not visible. Most elements of construction would be highly visible and within the direct frame of view for PRow users and residents of nearby properties, but parts would be screened by intervening woodland blocks.</p> <p>There would therefore be an overall high magnitude of change and major adverse effect.</p>	
<p>Views from Ashley Road, Ashley, Arden House, Lower House Farm, Back Lane, Brickhill Lane, Castle Mill Lane, Thorns Green and PRow Ashley Footpath 6/3 (VPs 330-04-004, 330-02-006, 330-02-007, 330-02-008, 330-02-009, 331-02-001, 331-02-002, 331-02-003, 331-02-004, 331-02-005, 331-02-006 and 331-02-007)</p> <p>Map Numbers: LV-03-330 and 331</p>	<p>High and medium sensitivity receptors</p>
<p>Residents and walkers on PRow Ashley Footpath 6/3 and players at Ashley Cricket Club would experience substantial changes, some partially filtered through or screened by intervening vegetation, to near and middle-distance views due to the construction of the Ashley embankment, the Birkinheath Covert railway underbridge, the Ashley FP6/5 and Back Lane accommodation overbridges, the Lamb Lane, Ashley Road, Mobberley Road realignments, the Thorns Green cutting and the Castle Mill Lane realignment, overbridge and diversion. The large-scale features associated with construction including machinery, earthworks, temporary stockpiles and the Birkinheath Covert, Mobberley Road (north and south) and Castle Mill Lane satellite construction compounds would be uncharacteristic of existing views of the open, rural landscape around Ashley. Most features would be highly visible and within the direct frame of view for residents and PRow users, but parts of the Proposed Scheme would be screened by intervening vegetation. Vehicles using site haul routes would introduce uncharacteristic movement into views.</p> <p>There would therefore be an overall high magnitude of change and major adverse effect.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>
<p>Construction vehicles using Ashley Road would increase vehicle movements in existing views of a quiet country lane from residential properties in Ashley Road (VP 330-004-004). Residents would have distant, filtered views of construction activity on the Ashley embankment.</p> <p>There would therefore be an overall medium magnitude of change and moderate adverse effect.</p>	<p>Level of effect:</p> <p>Moderate adverse (significant)</p>
<p>Views from Sun Bank Wood and PRow Footpath 14 (north side River Bollin), Sunbank Lane, Burnside, Marfield, Warburton Close and Warburton Drive (VPs 332-02-001, 332-04-002, 332-02-003 and 332-02-005)</p> <p>Map Number: LV-03-332</p>	<p>High and medium sensitivity receptors</p>
<p>Occupants of residential properties on Sunbank Lane and on the southern boundary of Warburton Green and Hale Barns, walkers in Sunbank Wood and users of Sunbank Lane would experience substantial changes, some partially filtered through or screened by intervening vegetation, to near and middle distance views due to the construction of the River Bollin South and River Bollin North embankments, the River Bollin East viaduct, the Halebank cutting, the Sunbank Lane auto-transformer station, the Sunbank Lane overbridge, the M56 East box structure and the Manchester Airport High Speed Station cutting. The large-scale features associated with construction including machinery, earthworks, temporary stockpiles and the River Bollin East viaduct, Sunbank Lane and the M56 East satellite construction compounds would be uncharacteristic of existing views of the wooded Bollin valley landscape and open space on the urban edge of Greater Manchester. Most features would be highly visible and within the direct frame of view for residents and PRow users but parts of the Proposed Scheme would be screened by intervening vegetation. Vehicles using site haul routes would introduce uncharacteristic movement into views.</p> <p>There would therefore be an overall high magnitude of change and major adverse effect.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>

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<p>Views from Hale Road, Runger Lane, Hasty Lane, Brooks Drive, Davenport Green Hall and Roaring Gate Lane and (VP 332-02-006, 332-05-007, 332-02-008, 333-05-001 and 333-02-003) Map Number LV-03-332 and 333</p>	<p>Medium-high to High sensitivity receptors</p>
<p>Residents and hotel guests would experience substantial changes, most filtered through or partially screened by intervening vegetation, to near and middle-distance views as a result of the construction of the Manchester Airport High Speed Station cutting, the Halebank cutting, the Manchester Tunnel South portal and building, the Manchester Airport High Speed Station and the extensive changes to the road network. The large-scale features associated with construction including machinery, demolitions, earthworks, temporary stockpiles and the Manchester Airport High Speed Station North satellite construction compounds and the Manchester Tunnel South Portal main compound, would be uncharacteristic of existing views of the rural-urban fringe landscape on the edge of Greater Manchester. The removal of trees and woodland from Davenport Green Wood (ancient woodland), Hale Road and Hasty Lane would open up views of construction from the surrounding area.</p> <p>There would therefore be an overall high magnitude of change and major adverse effect.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>

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. Therefore, no other mitigation measures are considered practicable during construction.

Summary of likely residual significant effects

- 11.4.13 The temporary residual significant effects during construction remain as described above. These effects would be temporary and reversible in nature lasting only for the duration of the construction works. These residual effects would generally arise from the widespread presence of construction activity and construction plant within the landscape and viewed by surrounding residents, and users of PRow and main roads within the study area.
- 11.4.14 The significant effects that would remain after implementation of construction phase mitigation are summarised below:
- major adverse effects in relation to one LCA;
 - moderate adverse effects in relation to one LCA;
 - major adverse effects in relation to at 23 residential viewpoint locations;
 - major adverse effects in relation to at six recreational viewpoint locations;
 - major adverse effects in relation to at one transport viewpoint location;
 - moderate adverse effects in relation to one transport viewpoint location; and
 - major adverse effects in relation to two hotel 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 currently being considered, but which are not yet part of the design and will be informed by engagement with the relevant stakeholders, include:

- design of earthworks to tie the engineering earthworks for embankments such as the Millington and Ashley embankments, cuttings such as the Rostherne, Halebank and Manchester Airport High Speed Station cuttings and bridges such the Peacock Lane East and Millington Lane overbridges into their wider landscape context and to mitigate views of structures and overhead line equipment from sensitive receptors, where reasonably practicable. Earthworks design also takes account of the relationship to surrounding land uses and management, such as agriculture;
- woodland planting, using the same species composition and planting types (and appropriate planting density), to compensate for the partial loss of woodland at Millington Clough, at Blackburns Brook, along the River Bollin and at Davenport Green and to provide habitat connectivity, enhanced landscape/green infrastructure connectivity, as well as connectivity of historic landscape features, , and to soften the appearance of embankments, viaduct abutments and cuttings and integrate them into the landscape;
- hedgerow replacement and restoration in areas of loss to restore connectivity and landscape pattern, where reasonably practicable, using an appropriate palette of hedgerow types and species, to tie the Proposed Scheme mitigation into the wider landscape character;

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 Peacock Lane East overbridge, the Agden Brook viaduct, the Rostherne cutting, Blackburn's Brook viaduct, the Ashley embankment, Mobberley Road diversion and associated underbridge under the Mid-Cheshire Line, the Back Lane accommodation overbridge, the River Bollin East viaduct, the Manchester Airport High Speed Station cutting, the Manchester Airport High Speed Station and car park and the Manchester Tunnel South portal building and autotransformer building. Effects also relate

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to changes to the highways network, the loss of woodland, introduction of trains, overhead line equipment, and the new areas of public realm at Manchester Airport High Speed Station.

Landscape assessment

- 11.5.4 Based on the current design, it is currently anticipated that the LCAs described in Table 24 would be significantly affected during operation of the Proposed Scheme.

Table 24: Operational phase significant landscape effects

<p>Ashley Lower Farms and Woods</p>	<p>Medium susceptibility and sensitivity</p>
<p>Susceptibility to change: the gently undulating topography, transport infrastructure, moderate degree of visual containment, intact pattern of hedgerows and hedgerow trees, and overall rural character impart a medium susceptibility to change arising from the Proposed Scheme.</p> <p>Year 1: The LCA would be directly affected by the introduction of large-scale linear features including the Rostherne embankment and cutting, the Blackburn’s Brook embankment and viaduct, the Rostherne embankment, the Ashley embankment, the Thorns Green cutting and the River Bollin South embankment which would disrupt the pattern of the rural landscape. The Lamb Lane, Mobberley Road and Castle Mill Lane realignments would increase the extent of the road network in the LCA. The new bridge over the Mid-Cheshire Line associated with the Mobberley Road realignment and the Back Lane accommodation overbridge would be, due to their large scale, uncharacteristic features in an otherwise flat landscape of narrow country lanes. Existing major transport infrastructure in the LCA, in the form of the M56 and Manchester Airport, has a widespread influence on it and consequently, the Proposed Scheme would not be a wholly uncharacteristic addition to the LCA. The rural landscape around Ashley and Thorns Green would effectively be bound by the M56 to the north and the Proposed Scheme to the south, although connectivity in the PRoW network would be maintained with new footbridges and shared farm access bridges. There would be a loss of characteristic landscape features including ancient woodland north of Rostherne and fields, trees and hedgerows around Ashley. Tranquillity would be reduced by the increased activity arising from the operation of the railway and traffic on the Mobberley Road realignment as it crosses over the Mid-Cheshire line. The embankments, viaducts, cuttings, bridges, overhead line equipment and fencing would result in substantial changes to key characteristics of the LCA, which would permanently affect part of the area.</p> <p>There would therefore be an overall high magnitude of change and major adverse effect.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>
<p>Year 15: New woodland planting along the Proposed Scheme and the restoration of the hedgerow pattern would provide some integration of the new structures into the landscape by summer of year 15 in most of the LCA. The large scale of the Proposed Scheme in relation to the scale of the existing landscape means that it would remain prominent in the landscape around Ashley, but overall, the proportion of the LCA affected by the Proposed Scheme would be reduced.</p> <p>The magnitude of change would reduce to medium and there would be a moderate adverse effect.</p>	<p>Level of effect:</p> <p>Moderate adverse (significant)</p>
<p>Hale and Davenport Green Urban Fringe</p>	<p>Low-medium susceptibility and sensitivity</p>
<p>Susceptibility to change: the mainly low-lying landform, woodlands, moderate degree of visual containment, transport infrastructure, tree-lined watercourses and rural-urban fringe character impart a low-medium susceptibility to change arising from the Proposed Scheme.</p> <p>Year 1: The eastern end of the LCA, from the River Bollin to Davenport Green, would be directly affected by the severance of the landscape due to the introduction of deep cuttings at Halebank and Manchester Airport High Speed Station. There would be permanent loss of landscape features, such ancient woodland at Davenport Green Wood and woodland along the River Bollin. The River</p>	<p>Level of effect:</p> <p>Moderate adverse (significant)</p>

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<p>Bollin East viaduct would be a prominent and uncharacteristic new feature in the secluded, wooded River Bollin valley. The Manchester Airport High Speed Station, the station multi-storey car park and the Manchester Tunnel South portal building and autotransformer station, would be prominent new features in the landscape, but not wholly uncharacteristic of the LCA which is already heavily influenced by the presence of the airport and the M56. The new public realm associated with the station would be largely screened from the wider area by the station buildings and the M56. Changes to the A538 Hale Road would be largely inconspicuous in the context of the existing major road network of the area. Pedestrian and cycle connectivity would be reduced with the closure of Hasty Lane, the Ringway Footpaths 7, 8, 9 and 11 and the Hale Footpath 16. Tranquillity would not be noticeably affected by the operation of the railway due to the existing high level of noise and activity generated by the M56. The Proposed Scheme would result in noticeable changes to key characteristics in the eastern part of the LCA.</p> <p>There would therefore be an overall medium magnitude of change and moderate adverse effect</p>	
<p>Year 15: New woodland planting in the Bollin valley, along the Halebank cutting and the west side of the Manchester Airport High Speed Station cutting would provide some integration of the new structures into the landscape by summer of year 15. The large-scale of the new station and multi-storey carpark in relation to the existing landscape means that there would continue to be a noticeable change to landscape character.</p> <p>The magnitude of change would remain medium and there would be a moderate adverse effect.</p>	<p>Level of effect:</p> <p>Moderate adverse (significant)</p>

Visual assessment

Introduction

- 11.5.5 The following section describes the likely significant effects on visual receptors during operation year 1 and year 15. Effects at operation year 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 25 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: MAo6 Map Book

Table 25: Operational phase significant visual effects

<p>Views from Millington Hall, Booth Bank and PRoW Millington Footpaths 2/1, 4/1 and 5/1 (VPs 317-03-007, 317-02-010 and 318-02-003)</p> <p>Map Numbers: LV-04-317 and 318</p>	<p>High and medium-high sensitivity receptors</p>
<p>Year 1 – winter and summer:</p> <p>Residents and walkers on footpaths would experience substantial changes, some partially filtered, through intervening vegetation, to near and middle-distance views as a result of the Proposed Scheme. The Peacock Lane East overbridge (in the MAo3 Pickmere to Agden and Hulseheath area), the Millington Clough culvert, the Millington embankment and Agden Brook viaduct would be large-scale infrastructures, uncharacteristic of the existing small-scale views of the wooded landscape of Millington Clough and the Agden Brook valley. The loss of trees and woodland during construction from Millington Lane, Millington Clough and the Agden Brook valley, would remove key features that contribute to the wooded and rural character of the existing view, and the new</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>

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<p>structures along with the overhead line equipment and movement of trains would be prominent in the view.</p> <p>There would therefore be an overall high magnitude of change and major adverse effect.</p>	
<p>Year 15 – summer:</p> <p>Views of the Peacock Lane East overbridge (in the MA03 Pickmere to Agden and Hulseheath area), the Millington Clough culvert, the Millington embankment and Agden Brook viaduct, boundary fencing and overbridges would remain clearly visible from PRoW and some residential properties. The Millington embankment would be largely screened from PRoW Millington Footpath FP2/1 by maturing landscape mitigation planting, but the Peacock Lane East overbridge would remain visible from this location. The new structures, overhead line equipment and the movement of trains would continue to be prominent in views.</p> <p>The magnitude of change would remain high and there would be a major adverse effect.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>
<p>Views from Hope Cottage, Newhall Farm and nearby cottages, Mereside Cottage and Covert Cottage and PRoW Millington Footpaths 7/2, 8/1 and 11/1 and Rostherne Footpaths 2/1 and 4/1 (VPs 318-03-004, 329-02-001, 329-03-002, 329-02-004, 329-03-005, and 329-02-007)</p> <p>Map Number: LV-04-318 and 329</p>	<p>High and medium-high sensitivity receptors</p>
<p>Year 1 – winter and summer:</p> <p>Walkers on footpaths and occupants of residential properties would experience substantial changes, some partially filtered through intervening vegetation, to near and middle-distance views as a result of the Proposed Scheme. The Rostherne cutting would be clearly visible as a wide, deep linear feature, cutting across the open landscape. The A556 Chester Road overbridge and Millington Footpath 7/2 accommodation overbridge would also be visible as new elements in the landscape, but would be less prominent as they would cross the Proposed Scheme at existing ground level. The cuttings and overbridges would be seen in the context of the M56 and the A556 Chester Road, which can be seen from some locations in the area, and the new infrastructure, therefore, would not be uncharacteristic components of existing views. Overhead line equipment and the movement of trains would be screened from more distant views by being in deep cutting. The loss of mature oak trees along Millington Lane and the red-brick 19th century farm house and farm buildings of Bowdon View Farm would remove key features that contribute to the rural character of the existing view. The mitigation hedgerow planting would not contribute to any visual integration or enclosure at this stage.</p> <p>There would therefore be an overall medium magnitude of change and moderate adverse effect.</p>	<p>Level of effect:</p> <p>Moderate adverse (significant)</p>
<p>Year 15 - summer:</p> <p>Views of the cuttings and overbridges would be largely screened from residential properties and from most stretches of the PRoW by mitigation planting. Where the structures are visible, they would be integrated into the view by mitigation planting.</p> <p>Due to the maturing vegetation present in the view, effects would reduce to non-significant by year 15.</p>	<p>Level of effect:</p> <p>Non-significant</p>

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<p>Views from Briddon Weir Farm, Birkin House and PRoW Rostherne Footpath 5/1 and Ashley Footpath FP3/1 (VPs 330-02-002, 330-03-003 and 330-03-005) Map Number: LV-04-330</p>	<p>High and Medium-high sensitivity receptors</p>
<p>Year 1 – winter and summer:</p> <p>Residents and walkers on footpaths would experience substantial changes near and middle-distance views as a result of the Proposed Scheme. Blackburn’s Brook viaduct would be visible from PRoW Rostherne FP5 and Ashley FP3 and nearby residential properties as a high wide structure cutting across the wooded valley of Blackburns Brook and Birkin Brook. The viaduct and railway on embankment would be large-scale infrastructure elements, which would be uncharacteristic of the existing small-scale views of the wooded river valley and open, rural landscape. The loss of woodland along the Proposed Scheme would remove key features that contribute to the wooded and rural character of the existing view and the new structures, along with the overhead line equipment movement of trains would be apparent in open and partially screened or filtered views. The landscape mitigation planting would not contribute to any visual integration or enclosure at this stage. Landscape earthworks would partially screen the embankment and trains from the south.</p> <p>The magnitude of change would be high and there would be a major adverse effect.</p>	<p>Level of effect: Major adverse (significant)</p>
<p>Year 15 - summer:</p> <p>Views of the viaduct and trains from residential properties would be largely screened by landscape mitigation planting. The viaduct and trains would remain visible in close views from the footpaths, integrated into the view by mitigation planting.</p> <p>Due to the maturing vegetation present in the view, effects would reduce to non-significant by year 15.</p>	<p>Level of effect: Non-significant</p>
<p>Views from Ashley Road, Ashley, Arden House, Lower House Farm, Back Lane, Brickhill Lane, Castle Mill Lane, Thorns Green and PRoW Ashley Footpath 6/3 (VPs 330-02-006, 330-02-007, 330-02-008, 330-02-009, 331-02-001, 331-02-002, 331-02-004, 331-02-005, 331-02-006 and 331-02-007) Map Numbers: LV-04-330 and 331</p>	<p>High and Medium sensitivity receptors</p>
<p>Year 1 – winter and summer:</p> <p>Residents, cricketers (and spectators) and PRoW users would experience substantial changes to parts of near and middle-distance views as a result of the Proposed Scheme. The Ashley embankment, along with overhead line equipment and movement of trains, would be seen against the skyline, introducing a high, wide linear feature across views of the rural landscape around Ashley and Thorns Green. The Ashley FP6/5 and Back Lane accommodation overbridges and the Mobberley Road underbridge under the Mid-Cheshire line would be new high, structures and prominent in views across the flat landscape. The Thorns Green cutting would be clearly visible as a wide, deep linear feature, cutting across the open landscape. The loss of mature trees (especially oaks) and hedgerows from farmland and woodland bordering Ashley Road and Mobberley Road and from Ecclesfield Wood would remove features that contribute to the historic and rural character of the existing view. Landscape earthworks would partially screen the embankments and trains from Ashley.</p> <p>There would therefore be an overall high magnitude of change and major adverse effect.</p>	<p>Level of effect: Major adverse (significant)</p>
<p>Year 15 Summer:</p> <p>Views of the embankment, road diversions and overbridges would remain but they would be partially screened or filtered by mitigation planting.</p>	<p>Level of effect: Moderate adverse (significant)</p>

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<p>The magnitude of change would be reduced to medium and there would be a moderate adverse effect.</p>	
<p>Views from Sun Bank Wood and PRoW Footpath 14 (north side River Bollin), Sunbank Lane, Burnside, Marfield, Warburton Close and Warburton Drive (VPs 332-03-001, 332-04-002, 332-02-003 and 332-02-005) Map Number: LV-04-332</p>	<p>High, Medium-high and Medium sensitivity receptors</p>
<p>Year 1 – winter and summer:</p> <p>Residents and PRoW Footpath 14 users would experience substantial changes to near and middle-distance views as a result of the Proposed Scheme. The large-scale River Bollin South and River Bollin North embankments and the River Bollin East would, along with the Sunbank Lane auto-transformer station, overhead line equipment and trains be uncharacteristic of existing views of the wooded Bollin valley landscape and open space on the urban edge of Greater Manchester. The Halebank and Manchester Airport High Speed Station cuttings and the new Sunbank Lane overbridge would be clearly visible from Hale Bank, Warburton Green, but seen in the context of the existing signage, lighting and gantries on the M56, above intervening vegetation. The Sunbank Lane overbridge and Sunbank Lane realignment would be visible from dwellings in Sunbank Lane. The loss of mature trees and woodland from the River Bollin valley would remove elements that contribute to the wooded character of the existing view and would open up views along the valley. The removal of woodland from around the slip roads to the M56 would increase the visibility of the M56 from South Hale. Landscape earthworks would partially screen the Manchester Airport High Speed Station cutting from the north.</p> <p>There would therefore be an overall high magnitude of change and major adverse effect.</p>	<p>Level of effect:</p> <p>Major adverse (significant)</p>
<p>Year 15 -summer:</p> <p>The River Bollin East viaduct, overhead line equipment and movement of trains would remain visible in open views from PRoW Footpath 14 (VP 332-03-001) and the Sunbank Lane overbridge and Sunbank Lane realignment would remain visible from dwellings on Sunbank Lane (VP 332-02-03), although the views would be framed by mitigation planting.</p> <p>The magnitude of change would be reduced to medium and there would be a moderate effect.</p>	<p>Level of effect:</p> <p>Moderate adverse (significant)</p>
<p>Year 15 - summer:</p> <p>The Halebank and the Manchester Airport High Speed Station cuttings would be largely screened from the residential areas of Warburton Green and South Hale (332-02-005) and from Sunbank Lane (VP 332-04-02)</p> <p>Due to the maturing vegetation present in the view and effects would reduce to non-significant by year 15.</p>	<p>Non-significant</p>
<p>Views from Hale Road and Brooks Drive (VP 332-02-006 and 332-02-008) Map Number: LV-04-332</p>	<p>High sensitivity receptors</p>
<p>Year 1 – winter and summer:</p> <p>Residents and cricketers (and spectators) at the Hale Barns Cricket Club (off Brooks Drive) would experience noticeable changes to middle-distance views as a result of the Proposed Scheme. The Manchester Airport High Speed Station, cutting, access road and multi-storey car park would be large-scale new infrastructure elements, visible in the background, above or through intervening vegetation from Brooks Drive, Hale Road and the cricket club. The Manchester Tunnel South portal and autotransformer station would be new prominent features in existing views over agricultural land from Hasty Lane and Hale Road. The loss of trees and woodland from</p>	<p>Level of effect:</p> <p>Moderate adverse (significant)</p>

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<p>Davenportgreen Wood (ancient woodland), Hale Road, Hasty Lane and east of Roaring Gate Lane would remove elements that contribute to the wooded quality of existing views.</p> <p>There would therefore be an overall medium magnitude of change and moderate adverse effect.</p>	
<p>Year 15 Summer:</p> <p>Manchester Airport High Speed Station and car park would continue to be visible in filtered and partially screened views from Hale Lane, Brooks Drive and the Hale Barns Cricket Club.</p> <p>The magnitude of change would remain medium and there would be a moderate adverse effect.</p>	<p>Level of effect:</p> <p>Moderate adverse (significant)</p>

Other mitigation measures

- 11.5.8 The permanent effects of the Proposed Scheme on landscape and visual receptors have been reduced through integration of the measures described in this section. Effects in Year 1 may also be further reduced through establishing planting early or in advance of the main construction programme. Other features such as additional earthworks, planting or greenspace, including use of materials, would be considered as part of the ongoing development of contextual design. These measures would potentially provide additional screening and/or greater integration of the Proposed Scheme into the landscape.

Summary of likely residual significant effects

- 11.5.9 In many cases, significant effects would reduce over time as the proposed mitigation planting matures and reaches its designed intention. However, the following likely residual significant effects would remain following year 15 of operation:

- moderate adverse effects in relation to two LCAs;
- major adverse visual effects in relation to 15 residential viewpoint locations;
- major adverse effects in relation to four recreational viewpoint locations;
- major adverse effects in relation to one transport viewpoint locations;
- moderate adverse effects in relation to five residential viewpoint locations; and
- moderate adverse effects in relation to three recreational viewpoint locations.

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 Hulseheath to Manchester Airport 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 Hulseheath to Manchester Airport area. The assessment considers existing businesses, community organisations, local employment and local economies, including planned growth and development.
- 12.1.2 Engagement with Cheshire East Council (CEC), Trafford Metropolitan Borough Council (TMBC) and Manchester City Council (MCC) 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 are provided in the Volume 2: MAo6 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.

12.3 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 Hulseheath to Manchester Airport area. It lies within the administrative areas of CEC and TMBC, with a small section within MCC's jurisdiction. The area also lies within the Greater Manchester Combined Authority (GMCA) area. The southern section of the area falls within the Cheshire and Warrington Local Enterprise

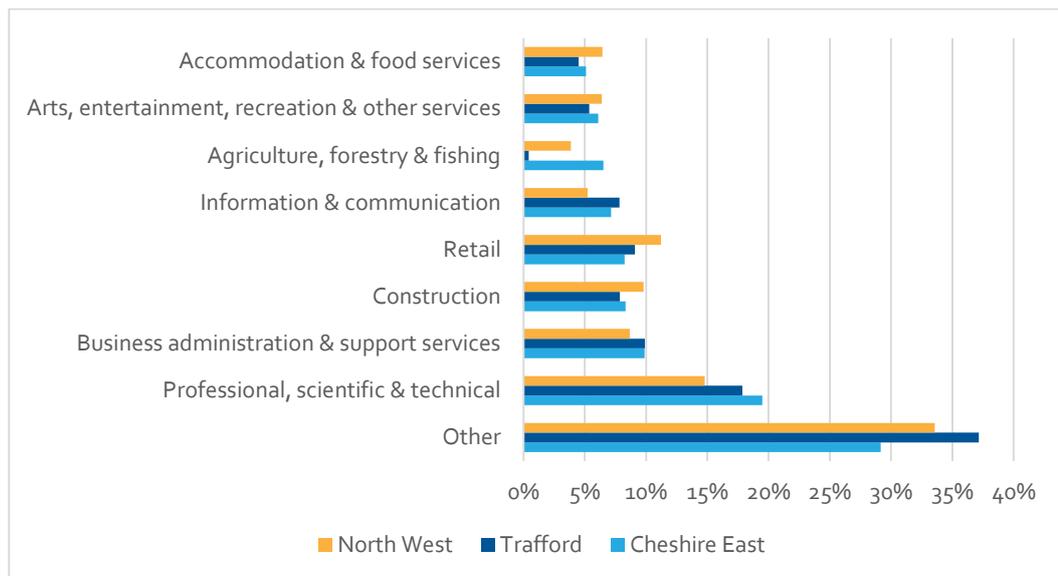
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Partnership (LEP) area¹⁰⁷ and the northern section of the area falls within the Greater Manchester Local Enterprise Partnership area¹⁰⁸. It also falls within the North West region. Given the minor extent which the Davenport Green to Ardwick area (MA07) is within MCC, MCC is not included within the socio-economic baseline.

*Business and labour market*¹⁰⁹

12.3.2 Within the CEC area there is a wide spread of organisation types, which reflects a diverse range of commercial activities. In 2017, the professional, scientific and technical sector accounted for the largest proportion of organisations (20%). Business administration and support services were the second largest sector (10%), followed by both construction and retail (8% each)¹¹⁰. 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%)¹¹¹. 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 CEC and TMBC areas and the North West ^{112, 113}



¹⁰⁷ 871candwep.co.uk. (2017) *Cheshire and Warrington Local Enterprise Partnership* | Cheshire and Warrington Local Enterprise Partnership. [online] Available at: <http://www.871candwep.co.uk/>

¹⁰⁸ Greater Manchester Local Enterprise Partnership (2013). *Stronger Together - Greater Manchester Strategy*. GMCA

¹⁰⁹ This section focusses on baseline information for CEC and TMBC areas since only a small section of the route in the Hulseheath to Manchester Airport area lies within the MCC area. Property baseline information is set out for all three areas since they may all include potential sites or land for relocation of businesses.

¹¹⁰ Office for National Statistics; (2017); UK Business Count – Local Units; <http://www.nomisweb.co.uk>; this number includes both residents and non-residents of CEC who work within its boundaries.

¹¹¹ Office for National Statistics; (2017); UK Business Count – Local Units; <http://www.nomisweb.co.uk>; this number includes both residents and non-residents of CEC who work within its boundaries.

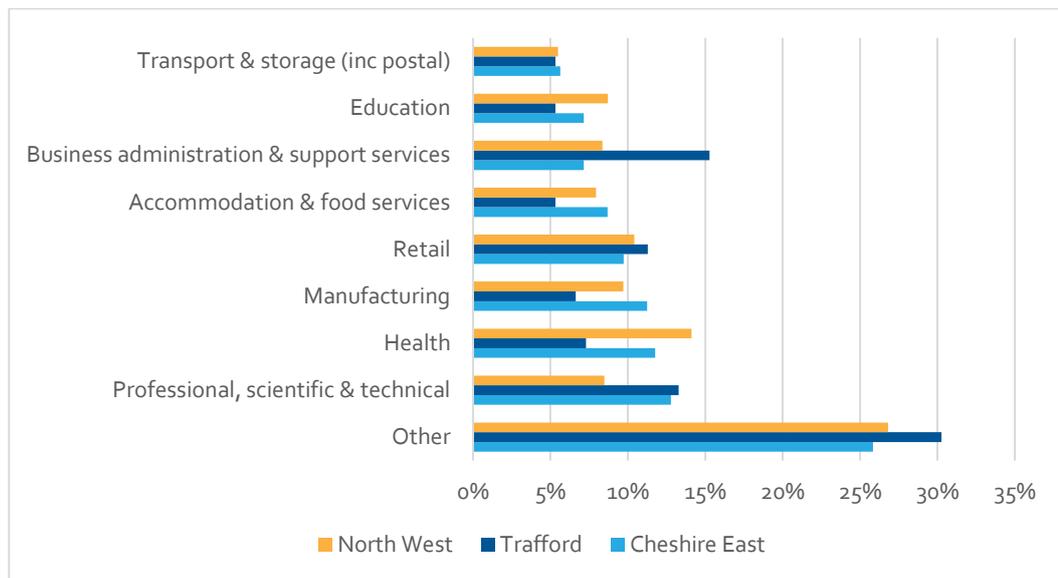
¹¹² Office for National Statistics; (2017); UK Business Count – Local Units; <http://www.nomisweb.co.uk>; this number includes both residents and non-residents of CEC who work within its boundaries.

¹¹³ 'Other' includes: Health; Wholesale; Manufacturing; Property; Transport and storage (including postal); Motor trades; Financial and insurance; Education; Public administration and defence; Mining, quarrying and utilities

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- 12.3.3 In 2016, approximately 195,000 people worked in the CEC area¹¹⁴. According to the Office for National Statistics Business Register and Employment Survey 2016, the largest sectors in terms of share of employment in the CEC area were: professional, scientific and technical (13%), health (12%) and manufacturing (11%)¹¹⁵. In 2016, approximately 150,000 people worked in the TMBC area. The top 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 This is compared with the largest sectors for the North West region, which were health (14%), retail and manufacturing (both 10%). This is shown in Figure 9.

Figure 9: Employment by industrial sector in CEC and TMBC areas and the North West ^{116, 117}



- 12.3.5 According to the Annual Population Survey (2016)¹¹⁸, the employment rate¹¹⁹ within the CEC area was 76% (170,900 people) and 80% (118,400 people) in the TMBC area. This is higher than that estimated for the North West (72%) and England (74%). Unemployment in the CEC area was 4.5% 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 39% of CEC residents and 52% of TMBC residents aged 16-64 were qualified to National Vocational Qualification Level 4 (NVQ4) and above, compared to 34% in the North West and 38% in England. Whilst 6% of CEC residents and 5% of TMBC residents had

¹¹⁴ Office for National Statistics; (2017); UK Business Count – Local Units; <http://www.nomisweb.co.uk> .

¹¹⁵ Office for National Statistics; (2016); Business Register and Employment Survey; <http://www.nomisweb.co.uk>

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: Financial and insurance; Arts, entertainment, recreation and other services; Construction; Information and communication; Wholesale; Public administration and defence; Motor trades; Property; Mining, quarrying and utilities; 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

no qualifications, which are lower than those for the North West (10%) and England (8%).

Property

- 12.3.7 A review of employment land in 2012¹²⁰ identified a need for up to 15.4ha of general business land a year to 2030 in the CEC area. In rural parts of the CEC area there is a lack of modern, industrial space but good availability of high quality office space in business parks, though fewer budget options in rural areas. The Knutsford area also has a good availability of office space.
- 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 year¹²¹. 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 2026¹²².
- 12.3.9 The draft Greater Manchester Spatial Framework (2016)¹²³ identifies the Manchester Airport area as one of the main areas of economic growth and development in Greater Manchester. The importance of developing adequate employment sites is necessary for the GMCA's strategy to support economic growth.
- 12.3.10 The average vacancy rate for industrial and warehousing property in the CEC and TMBC areas in March 2018 has been assessed as 24% and 13% respectively based on marketed space against known stock¹²⁴.

12.4 Effects arising during construction

Avoidance and mitigation measures

- 12.4.1 The draft Code of Construction Practice (CoCP)¹²⁵ 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);

¹²⁰ Arup (2012), *Cheshire East Employment Land Review*. Based on upper range (includes 30% flexibility factors) covering 2009-2030

¹²¹ Ove Arup and Partners Ltd (2009), *Trafford Employment Land Study: Final Report*. Based on upper range.

¹²² Trafford Metropolitan Borough Council (2013), *Trafford Employment Land Study*

¹²³ Greater Manchester Combined Authority (2016). Available online at: <https://www.greatermanchester-ca.gov.uk/GMSF>

¹²⁴ Vacant space is based on marketed space identified from Estates Gazette data (EGi); stock data is taken from information supplied by the Valuation Office (VOA)

¹²⁵ Supporting document: Draft Code of Construction Practice

- monitor and manage flood risk and other extreme weather events that may affect socio-economic resources during construction (Section 13);
- site specific traffic management measures including requirements relating to the movement of traffic from business and commercial operators of road vehicles, including goods vehicles (Section 14); and
- maintaining access to businesses for the duration of construction works where reasonably practicable (Section 14).

Assessment of impacts and effects

12.4.2 The proposed construction works are assessed for socio-economic effects in relation to:

- premises demolished with their occupants and employees needing to relocate to allow for construction of the Proposed Scheme;
- in-combination effects (e.g. air quality, noise, vibration, construction traffic and visual impacts) and isolation of an area, which could affect business 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 two main construction compounds, the Manchester Airport High Speed Station Main Compound and Transfer Node and the Manchester Tunnel South Portal Main Compound, 15 satellite compounds and two rail system compounds in the Hulseheath to Manchester Airport area. The works undertaken at and managed from these sites would result in the creation of up to 3,700-person years of construction employment¹²⁶, which is broadly equivalent to 370 full-time jobs¹²⁷. Depending on skill levels required and the skills of local people, this 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 the expenditure of construction workers. The impact of the indirect

¹²⁶ 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

¹²⁷ Based on the convention that 10 employment years is equivalent to one full time equivalent job

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 Twelve business accommodation units or sites in the study area would experience direct impacts as a result of the Proposed Scheme. These 12 units or sites, together, form nine defined resources including:
- Booth Bank Farm (one unit engaged in the provision of a variety of programmes for terminally ill, disabled and disadvantaged children);
 - Cherry Tree Farm (four units engaged in the provision of beauty surgery activities, plantations and two vacant units);
 - Stock Farm (one unit engaged in provision of wedding and events venue);
 - Brickhill Lane (one unit engaged in provision of plant hire, ground work and reclamation);
 - Higher Thorns Green Farm (one unit engaged in the provision of farm-based activities for young people with autism and learning disabilities);
 - Chapel House Farm (one unit engaged in repair and modification of motor vehicles);
 - Hale Road (one unit engaged in the provision of a care home);
 - Hasty Lane (one unit engaged in the provision of a bed and breakfast); and
 - Manchester Airport Marriott Hotel (one unit engaged in the provision of accommodation with associated restaurant and hair boutique and spa facilities on-site).
- 12.4.8 Of the nine resources identified, two could potentially experience significant direct effects on business activities and employment, as set out in Table 26.

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Table 26: Resources which would potentially experience significant direct effects

Resource	Description of business activity
Higher Thorns Green Farm	Organisation providing farm based activities at Higher Thorns Green Farm for young people with Autism conditions and learning disabilities, in addition to managing other care facilities at other locations.
Manchester Airport Marriott Hotel	Large hotel with associated restaurant and bar, hair boutique and spa on-site.

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 27. It should be noted that a precautionary approach has been taken in this assessment as outlined in Section 1.2 and it may change by the time of the formal ES.

Table 27: Significance of effects on resources

Resource	Impact magnitude	Sensitivity	Significance of effect
Higher Thorns Green Farm	Medium	Medium	Moderate adverse
Manchester Airport Marriott Hotel	High	High	Major adverse

12.4.12 Construction of the Thorns Green Cutting would require the demolition of some farm buildings as well as the loss of farm land at Higher Thorns Green Farm. These facilities are used by the organisation at Higher Thorns Green Farm that offer residential, education and care services for children, young people and adults with Autism conditions and learning disabilities. In the absence of mitigation, the loss of these assets along with the likely disruption of the patients' routine would potentially impair the organisation's ability to operate at this location. The effect on this resource and its employees is assessed to be moderate adverse and would, therefore, be significant.

- 12.4.13 The construction of the Manchester Airport High Speed Station cutting would require the demolition of Manchester Airport Marriott Hotel. It is considered likely that the hotel and associated facilities are dependent upon their location adjacent to the Manchester Airport. Hotels are usually bespoke buildings, especially hotels of this size. They would, therefore, tend to acquire a site on which to build. It is considered that the operators may have difficulty in finding suitable alternative premises or a suitable site. The effect on this resource and its employees is assessed to be major adverse and would, therefore, be significant.
- 12.4.14 Among all the affected resources, whether significantly affected or not, it is estimated that 290 jobs¹²⁸ would either be displaced or possibly lost within the Hulseheath to Manchester Airport area. There is a reasonable probability that most 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, including larger employers, where alternative locations are problematic and the businesses may be unable to relocate on a like-for-like basis within the area. The impact on the local economy from the relocation or loss of jobs is considered to be relatively modest in the context of the total number of people employed in the district and borough authorities (approximately 195,000 jobs in CEC and 150,000 jobs in TMBC) and the scale of economic activity and opportunity in the area.
- 12.4.15 The resulting effects on employment are reported in aggregate at a route-wide level (see Volume 3, Route-wide effects).

Other mitigation measures

- 12.4.16 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.
- 12.4.17 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

- 12.4.18 Any likely residual significant socio-economic effects will be reported in the formal ES.

¹²⁸ Employment within businesses has been estimated through a combination of sources, for example, surveys of businesses, the Experian employment dataset, employment floor space and the Homes and Communities Agency (HCA) Employment Densities Guide 3rd Edition (2015). The estimate is calculated using standard employment density ratios and estimates of floor areas and may vary significantly from actual employment at the sites.

12.5 Effects arising from operation

Avoidance and mitigation measures

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

Assessment of impacts and effects

Resources with direct effects

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

Operational employment

- 12.5.3 Operational employment connected to the Proposed Scheme would be created at Manchester Airport Station, located within the Hulseheath to Manchester Airport area. The operation of Manchester Airport Station could result in the creation of approximately 20 full-time jobs and a further 20 full-time jobs associated with retail at the station. It is likely that some of these jobs would be accessed by local residents.
- 12.5.4 Direct operational employment created by the Proposed Scheme could lead to indirect employment opportunities for local businesses in terms of potentially supplying the Proposed Scheme or benefiting from expenditure of directly employed workers on goods and services.
- 12.5.5 The impact of operational employment creation will be assessed and reported at a route-wide level in Volume 3, Route-wide effects.

Other mitigation measures

- 12.5.6 Any further mitigation measures will be reported in the formal ES.

Summary of likely residual significant effects

- 12.5.7 Any likely residual significant socio-economic effects will be reported in the formal ES.

Monitoring

- 12.5.8 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme.
- 12.5.9 There are no area-specific requirements for monitoring socio-economic effects during the operation of the Proposed Scheme in the Hulseheath to Manchester Airport 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 Hulseheath to Manchester Airport 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 areas¹²⁹; and
 - 'non-residential receptors'¹³⁰ such as:
 - community facilities including schools, hospitals, places of worship and 'quiet areas'¹³¹; 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 policy¹³², planning policy, planning practice guidance on noise (PPGN)¹³³ and EIA Regulations as described in the Scope and Methodology Report¹³⁴ (SMR).
- 13.1.3 Engagement has been undertaken with Trafford Metropolitan Borough Council (TMBC), Cheshire East Council (CEC) and Manchester City Council (MCC) 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 Hulseheath to Manchester Airport 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

¹²⁹ '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.

¹³⁰ 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

¹³¹ '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

¹³² Noise Policy Statement for England, (2015) Department for Environment, Food & Rural Affairs (Defra)

¹³³ Department for Communities and Local Government (DCLG) (2014), Planning Practice Guidance – Noise. Available online at: <https://www.gov.uk/guidance/noise--2>

¹³⁴ Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

CT-o6) and operational sound, noise and/or vibration impacts and proposed noise mitigation (Map series SV-01), can be found in the Volume 2: MAo6 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 villages, hamlets and isolated residential properties along with Manchester Airport and associated commercial premises. The sound environment is generally dominated by the local and distant road traffic. There are also contributions from trains, low flying aircraft to and from Manchester Airport, commercial vehicles operating around the industrial park, and natural and agricultural sounds.

- 13.3.3 There are several main roads that contribute to the sound environment near to the route within the Hulseheath to Manchester Airport area. These include the M56 affecting Booth Bank, Ashley, Thorns Green, Hale Bank, Warburton Green, Hale Barns and Davenport Green; the newly opened A556, which affects Bucklow Hill, and the A538, which affects the Hale Barns area.
- 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 Agglomerations¹³⁵, Roads¹³⁶ or Railways¹³⁷. HS2 Ltd will engage with the Competent Authorities responsible for the relevant Important Areas. Map Series SV-01 (Volume 2: MAo6 Map Book) shows any noise Important Areas in the Hulseheath to Manchester Airport 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)¹³⁸. 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 following assumptions have also been made in relation to the construction methods specific to the Hulseheath to Manchester Airport area.
- 13.4.3 At the Manchester Tunnel South portal, tunnelling support activities (including erection of the tunnel boring machine (TBM), support for the TBM as it excavates, excavated material handling, installation of tunnel lining and tunnel fit-out) would require 24hr working for reasons of safety or engineering practicability.

¹³⁵ Noise Action Plan: Agglomerations (large urban areas) (2014) Department for Environment, Food & Rural Affairs (Defra)

¹³⁶ Noise Action Plan: Roads (including major roads) (2014) Department for Environment, Food & Rural Affairs (Defra)

¹³⁷ Noise Action Plan: Railways (including major railways) (2014) Department for Environment, Food & Rural Affairs (Defra)

¹³⁸ Supporting document: Draft Code of Construction Practice

- 13.4.4 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

- 13.4.5 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 construction activities to minimise noise (including vibration) at neighbouring residential properties and other sensitive receptors¹³⁹;
 - 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.
- 13.4.6 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

¹³⁹ Including local businesses and quiet areas designated by the local authority

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.

- 13.4.7 Qualification for noise insulation and temporary re-housing would be confirmed as part of seeking prior consent from the local authority under Section 61 of the CoPA. Qualifying properties would be identified, as required in the draft CoCP so that noise insulation could be installed, or any temporary re-housing provided, before the start of the works predicted to exceed noise insulation or temporary re-housing criteria.

Assessment of impacts and effects

- 13.4.8 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: MAo6 Map Book):
- Hulseheath arising from construction activities associated with road realignments;
 - Booth Bank arising from construction activities associated with road realignments;
 - Thorns Green arising from construction activities associated with road realignments, overbridge construction, cutting and embankment formation and retaining wall construction;
 - Halebank arising from construction activities associated with road realignments, overbridge construction, cutting and embankment formation and retaining wall construction;
 - Warburton Green arising from construction activities associated with retaining wall construction, cutting formation and use of transfer nodes;
 - Hale Barns in the vicinity of Hasty Lane arising from construction activities associated with road realignments, overbridge construction, retaining wall construction, cutting formation and use of transfer nodes; and
 - Davenport Green arising from construction activities associated with the tunnelling site and road realignments.
- 13.4.9 Map Series SVo1 (Volume 2: MAo6 Map Book) shows key non-residential properties that have been identified within the study area as defined in the SMR. Of these, The Children's Adventure Farm Trust, Millington, is likely to experience significant effects (to be confirmed in the formal ES).
- 13.4.10 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.
- 13.4.11 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:

- the B5569 Chester Road between the M6 and the A556;
- Thowler Lane;
- Chapel Lane between the B5569 Chester Road and Peacock Lane;
- Rostherne Lane between the B5569 Chester Road and Ashley Road;
- Ashley Road between Rostherne Lane and Back Lane;
- Castle Mill Lane between Tanyard Lane and Mill Lane;
- Mill Lane between Castle Mill Lane and the A538 Wilmslow Road; and
- Sunbank Lane between the route and the A538 Wilmslow Road.

13.4.12 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

13.4.13 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

13.4.14 Further work is being undertaken to confirm significant construction noise and vibration effects, including any temporary indirect effects from construction traffic.

13.4.15 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 Hulseheath to Manchester Airport 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 six trains per hour in each direction on the HS2 main lines with an operating speed of around 230kph; trains which stop at the Manchester Airport station will reduce speed to stop at the station. 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 as far 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. Overall it is assumed that proven international technology would reduce noise emissions by approximately 3dB at 225mph (360kph) compared to the current minimum European standards¹⁴⁰.
- 13.5.6 The Proposed Scheme would incorporate noise barriers to avoid or reduce significant adverse airborne noise effects. The envisaged noise barrier locations based upon the currently available information are shown on Map Series SV-01 (Volume 2: MAo6 Map Book) and described in Section 2.2. In practice, barriers may differ from this description while maintaining the required acoustic performance.
- 13.5.7 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.
- 13.5.8 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 where¹⁴¹ noise from the use of the

¹⁴⁰ Technical Specification for Interoperability (TSI) Noise – EU Commission Regulation No 1304/2014

¹⁴¹ Following Government's National Planning Practice Guidance <https://www.gov.uk/government/collections/planning-practice-guidance>

Proposed Scheme measured outside a dwelling exceeds the Interim Target defined by the World Health Organization's (WHO) Night Noise Guidelines for Europe¹⁴² or the maximum noise level criteria¹⁴³ 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.

- 13.5.9 Noise can be generated at exits from tunnels due to pressure waves created inside the tunnel as the train enters. This is a well understood phenomenon and is mitigated by appropriate design and construction techniques. Porous tunnel portals, tunnels and vent shafts (where required) will be designed to avoid any significant airborne noise effects caused by the trains entering the tunnel.

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: MAo6 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.

¹⁴² World Health Organization (2010), *Night time Noise Guidelines for Europe*

¹⁴³ Dependent on the number of train passes

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 barriers, described in Volume 1 (Section 9), section 2.2 and presented in Map Series SV-01 (Volume 2: MAo6 Map Book) and Map Series CT-06 (Volume 2: MAo6 Map Book), would substantially reduce the potential airborne noise effects that would otherwise arise from the Proposed Scheme. It is anticipated that the mitigation would avoid likely significant adverse effects due to airborne operational noise on the majority of receptors and communities.
- 13.5.17 Taking account of the avoidance and mitigation measures this initial assessment has identified effects on a precautionary basis with the potential to be considered significant on a community basis due to increased airborne noise levels in line with the SMR at or around:
- Hulseheath: occupants of residential properties on Chapel Lane, located closest to the Proposed Scheme, identified by MAo6-Co1 on Map SV-01-319 (Volume 2: MAo6 Map Book); and
 - Millington: occupants of residential properties on Thowler Lane, located closest to the Proposed Scheme, identified by MAo6-Co2 on Map SV-01-319 (Volume 2: MAo6 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 individual residential properties closest to the Proposed Scheme in:
- Moss House Farm on Thowler Lane (identified on Map SV-01-319 in Volume 2: MAo6 Map Book; and
 - North Arden Lodge on Lamb Lane (identified on Map SV-01-320 in Volume 2: MAo6 Map Book).
- 13.5.19 Map Series SV01 (Volume 2: MAo6 Map Book) shows key non-residential properties for the assessment of operational airborne noise impacts in the formal ES. The initial assessment indicates that there are no significant effects identified at any non-residential receptors in this community area as a result of operational airborne noise.
- 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 Hulseheath to Manchester Airport area.
- 14.1.2 Engagement with Highways England, Cheshire East Council (CEC), Greater Manchester Combined Authority (GMCA), Trafford Metropolitan Borough Council (TMBC), Manchester City Council (MCC), Transport for Greater Manchester (TfGM) and Manchester Airport Group (MAG) 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, MAo6 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)¹⁴⁴.
- 14.2.2 The study area for traffic and transport includes the settlements of Altrincham, Ashley, Hale, Hale Barns, Mobberley, New Mills, Rostherne and Warburton Green. It also includes Tatton Park together with stations at Mobberley, Ashley, Hale, Altrincham, Navigation Road and Timperley. Manchester Airport and Styal stations are to the east of the study area.
- 14.2.3 The study area also includes all roads potentially affected by the Proposed Scheme. The strategic roads in the area are: the M56 junctions 6 to 8 and A556 (from the south (M6) to the north (M56)).
- 14.2.4 The local road in the study area are: the A538 Hale Road/Wilmslow Road, the B5569 Chester Road, Ashley Road, Back Lane, Brickhill Lane, Boothbank Lane, Castlemill Lane, Chapel Lane, Hasty Lane, Mill Lane, Millington Lane, Mobberley Road, Roaring Gate Lane, Rostherne Lane, Runger Lane, Shay Lane, Sunbank Lane, Tom Lane, Thorley Lane and Yarwoodheath Lane.

¹⁴⁴ Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

- 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.

14.3 Environmental baseline

Existing baseline

- 14.3.1 Existing conditions in the study area have been determined through site visits, traffic and transport surveys, liaison with Highways England, CEC, GMCA, MCC, TMBC, TfGM and MAG (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 Highways England, CEC, GMCA, TMBC, TfGM and MAG. Assessment of the data indicates that the peak hours in the area are 07:00-08:00 and 17:00-18:00. 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, the periods when HS2 construction traffic movements and workforce arrivals and departures would have the maximum impact. Consequently, the 08:00-09:00 and 17:00-18:00 have been used as the assessment hours representing a reasonable worst case.
- 14.3.3 PRoW surveys were undertaken in August and November 2017 to establish their nature and usage by non-motorised users (pedestrians, cyclists and equestrians). The surveys included PRoW and roads that would cross the route of the Proposed Scheme, and any additional PRoW and roads that may be affected by the Proposed Scheme. The majority of the PRoW surveys were undertaken during the weekend, at times when recreational use is expected to be highest, but where routes are likely to be used for non-leisure uses such as commuting, surveys were undertaken on a weekday.

Strategic and local highway network

- 14.3.4 The strategic routes that pass through the area are: the M56, which extends across this area from the west to the east; the north section of the A556; which connects from the south (M6) to the north (M56). The strategic road network in and around the Hulseheath to Manchester Airport 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 A538 Hale Road, Ashley Road, Back Lane, Brickhill Lane, Boothbank Lane, Castlemill Lane, Chapel Lane, Hasty Lane, Mill Lane, Millington Lane, Mobberley Road, Roaring Gate Lane, Rostherne Lane, Runger Lane, Shay Lane, Sunbank Lane, Tom Lane, Thorley Lane and Yarwoodheath Lane. The local

road network in this area generally operates well although some localised delays can be experienced, particularly at peak times.

- 14.3.6 Relevant accident data for the road network subject to assessment have been obtained from Department for Transport¹⁴⁵. Data for the three-year period (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 No accident clusters were identified within the Hulseheath to Manchester Airport area.
- 14.3.8 The route of the Proposed Scheme would cross three roads with footways within the Hulseheath to Manchester Airport area. These are: the A538 Hale Road, Ashley Road and Thorley Lane.

Parking and loading

- 14.3.9 Parking off Hale Barn Road (i.e. Manchester Airport Marriott Hotel) and Halebarns House could be affected by the Proposed Scheme.

Public transport network

- 14.3.10 Two bus routes operate on the A538 Hale Road that would be crossed by the route of the Proposed Scheme in the Hulseheath to Manchester Airport 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 includes route 88 (Knutsford - Mobberley - Wilmslow - Hale Barns - Altrincham); and route 288 (Altrincham Interchange - Manchester Airport).
- 14.3.11 National and local rail services are accessible via Ashley Station and local rail services are also accessible via Mobberley, Ashley, Hale, Altrincham, Navigation Road and Timperley and to the east, Manchester Airport and Styal stations. There are also Metrolink services available at Manchester Airport Station.

Non-motorised users

- 14.3.12 There are pedestrian footways adjacent to many of the roads in the more built up areas of Altrincham, Ashley, Hale, Hale Barns, Mobberley, New Mills, Rostherne and Warburton Green. Footways vary in width and condition within these areas. Where there is no formal footway provision adjacent to a road, non-motorised user numbers are generally low.
- 14.3.13 The route of the Proposed Scheme would cross the route of 21 PRoW within the Hulseheath to Manchester Airport 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 three of the PRoW. The routes with the greatest usage recorded during the survey day were Ringway Footpath 14 west of Sunbank Wood, which

¹⁴⁵ STAT19 Road Safety Data 2014-2016 from Department for Transport

was used by 100 pedestrians and eight cyclists; Hale Footpath 16 leading from Brook's Drive south of Davenport Green, which was used 46 pedestrians and 26 cyclists, and Hasty Lane (leading to Ringway Footpath 7), which was used by 10 pedestrians and 11 cyclists.

- 14.3.14 In the Hulseheath to Manchester Airport area, National Cycle Routes 70/Regional Cycle Route 70/Cheshire Cycleway (between Ashley and Mobberley) and Regional Cycle Route 85 (Manchester Airport Orbital Cycleway) (running south-east of junction 7 M56 along A538 Wilmslow Road to Morley Green) pass through the area.

Waterways and canals

- 14.3.15 There is one navigable waterway in the Hulseheath to Manchester Airport area, with the Bridgewater Canal located on the western edge of the assessment area. The River Bollin runs under the M56 from Thorns Green area westwards towards Dunham Park. However, it is not expected that there would be any effects on navigable waterways and this topic is not considered further in this assessment

Air transport

- 14.3.16 Manchester Airport is located north-east of the Hulseheath to Manchester Airport area, adjacent to the boundary with the Davenport Green to Ardwick area (MA07). The airport is primarily accessed from the strategic road network via the M56 junctions 5 and 6. Any impacts on highway or public transport access to the Airport will be identified. However, it is not expected that there would be any effects on air transport and this topic is not considered further in this assessment.

14.4 Effects arising during construction

Avoidance and mitigation measures

- 14.4.1 The following measures are currently proposed to avoid or reduce effects on transport users:
- new highways (roads and PRow) would be constructed and operational prior to the permanent closure of any existing highways, insofar as reasonably practicable;
 - the majority of roads crossing the route of the Proposed Scheme would be maintained or locally diverted during construction to limit the need for diversions of traffic onto alternative routes;
 - traffic management measures would be implemented to limit any disruption;
 - road closures would be restricted to overnight and weekends, insofar as reasonably practicable;

- temporary alternative routes for PRow would be provided during construction, insofar as reasonably practicable, where either the existing or final proposed route is not available;
- where reasonably practicable, site haul routes would be created adjacent to the route of the Proposed Scheme to transport construction materials and equipment to reduce heavy goods vehicle (HGV) movements on public roads with access taken via the main road network;
- HGV would be routed, insofar as reasonably practicable, along the strategic and/or primary road network;
- the use of the local road network would, insofar as reasonably practicable, be limited to use for site set-up, access for surveys and on-going servicing (including refuse collection and general deliveries to compounds) during construction;
- the reuse of excavated material along the route of the Proposed Scheme, insofar as reasonably practicable;
- highway measures including junction improvements, passing places and carriageway widening would be provided, as required, to manage the safe passing of construction vehicles on construction HGV routes; and
- on-site welfare facilities would be provided which would reduce daily travel by site workers.

- 14.4.2 Section 14 of the draft Code of Construction Practice¹⁴⁶ (CoCP) 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

¹⁴⁶ Supporting document: Draft Code of Construction Practice

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 plans¹⁴⁷ to be produced that would include a range of potential measures to mitigate the impacts of traffic and transport movements associated with construction of the Proposed Scheme.
- 14.4.7 Where works potentially affect Network Rail assets disruption to travelling passengers and freight movements would be reduced as far 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 as far 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 Hulseheath to Manchester Airport area are likely to include:
- construction vehicle movements to and from the various construction compounds;
 - road closures and associated realignments and diversions;
 - alternative routes for PRow; and
 - possessions on the conventional rail network.
- 14.4.9 The construction assessment has also considered any impacts in the Hulseheath to Manchester Airport 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

¹⁴⁷ 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.

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, MAo6 Map Book. Highway network.

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 M56 junction 6 to 8;
- the A538 Hale Road/Wilmslow Road;
- the B5569 Chester Road;
- Ashley Road;
- Birkinheath Lane;
- Brickhill Lane;
- Castle Mill Lane;
- Cherry Tree Lane;
- Chapel Lane;
- Dirty Lane;
- Hasty Lane;
- Mill Lane;
- Mobberley Road;
- Rostherne Lane;
- Sunbank Lane;
- Runger Lane; and
- Thorley Lane.

- 14.4.13 In addition to increases in traffic flows due to construction traffic, construction of the Proposed Scheme is expected to result in temporary highway closures and diversions or realignments as set out in Section 2.3. The works to construct

both temporary and permanent highway diversions/realignments could also result in disruption to highway users. These are expected to include:

- the A538 Hale Road (in vicinity of Hasty Lane and the M56 junction 6 slip roads);
- Ashley Road closure and diversion;
- Castle Mill Lane realignment;
- Mill Lane realignment;
- Millington Lane realignment;
- Mobberley Road realignment;
- Sunbank Lane realignment; and
- Thorley Lane realignment.

14.4.14 Permanent changes to highways are reported under operation.

14.4.15 Changes in traffic have the potential, at some locations, to result in increased travel distance, congestion and delays and increased traffic severance for non-motorised users. The assessment of these changes will be reported in the formal ES.

14.4.16 Assessment of the traffic and transport impacts from utilities works, either separately or in combination with other works, will be reported in the formal ES.

Accidents and safety

14.4.17 Changes in traffic as a result of the Proposed Scheme could result in changes in accident risk. The impacts on accident risk during construction of the Proposed Scheme will be reported in the formal ES.

Parking and loading

14.4.18 It is not expected that construction of the Proposed Scheme would have any impacts on parking and loading.

Public transport network

14.4.19 It is expected that construction of the Proposed Scheme would require bus route diversions, including bus routes 88 and 288. This could result in increased journey times and the need to relocate bus stops. Any consequent effects will be reported in the formal ES.

14.4.20 There are interfaces with the existing rail network in this area, in particular on the operation of the West Coast Mainline and its rail freight services. Rail possessions would be required to undertake localised works, including realignment of roads and diversions. 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:
- Ashley Footpath 6/5, north of Arden Lodge North, to be temporarily closed and diverted north of existing alignment;
 - Ashley Footpath 8/1, east of Arden Lodge North, to be temporarily diverted; and
 - Rostherne Footpath 5/1 to be temporarily closed during construction of Agden Brook viaduct.
- 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.

Permanent effects

- 14.4.25 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

- 14.4.26 The implementation of the draft CoCP, in combination with the construction workforce travel plan would help mitigate transport-related effects during construction of the Proposed Scheme.
- 14.4.27 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

- 14.4.28 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 A538 Hale Road/Wilmslow Road; the B5569 Chester Road; Ashley Road; Birkinheath Lane; Brickhill Lane; Castle Mill Lane; Cherry Tree Lane; Chapel Lane; Dirty Lane; Hasty Lane; Lamb Lane; Mill Lane; Millington Lane; Mobberley Road; Rostherne Lane; Sunbank Lane; Runger Lane; and Thorley Lane. Increases in

traffic could also result in increased traffic severance for non-motorised users of the routes and changes to traffic could result in changes to accident risk level.

- 14.4.29 Construction of the Proposed Scheme is expected to result in temporary closure/realignment or diversions of the A538 Hale Road (in vicinity of Hasty Lane/the M56 junction 6); Ashley Road; Castle Mill Lane; Mill Lane; Millington Lane; Mobberley Road; Sunbank Lane; and Thorley Lane.
- 14.4.30 Construction of the Proposed Scheme is expected to result in diversion of bus route 88 and route 288.
- 14.4.31 Construction of the Proposed Scheme is expected to result in rail possessions and closures which would result in disruption of services and result in increased traffic severance for users of public transport services.
- 14.4.32 Construction of the Proposed Scheme is expected to temporarily close/divert PRoW: Ashley Footpath 6/5; Ashley Footpath 8/1 and Rostherne Footpath 5/1.
- 14.4.33 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:
- Manchester Airport High Speed station would include provision for access by sustainable modes, including Metrolink, bus, walking and cycling, to promote non-car access and new car parking provision;
 - changes to the highway to accommodate users of the Proposed Scheme;
 - reinstatement of roads on or close to their existing alignments, where reasonably practicable; and
 - replacement, diversion or realignment of PRoW.
- 14.5.2 A station travel plan for Manchester Airport High Speed station would include measures that aim to reduce the impacts and effects of traffic and transport movements.

Assessment of impacts and effects

- 14.5.3 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

- 14.5.4 Manchester Airport High Speed station is a new HS2 station for the Proposed Scheme that would provide direct and fast access from a range of locations

including London and Birmingham. A key transport issue in the Hulseheath to Manchester Airport area is the beneficial impacts of the new and improved rail services and the opportunities to improve conventional rail services.

- 14.5.5 The operation of the Proposed Scheme could result in impacts within this area due to increased traffic associated with Manchester Airport High Speed station. However, the maintenance of the Proposed Scheme would generate limited vehicular trips.
- 14.5.6 The operational impacts would, therefore, primarily relate to the major improvements to travel opportunities and the potential impacts of additional users on the local transport networks. There would also be impacts due to permanent diversion, realignment, stopping up of roads and PRoW.

Public transport network

- 14.5.7 The Proposed Scheme would generate significant major beneficial effects for rail passengers, as a result of:
- the increase in rail network capacity provided by the introduction of High Speed services;
 - significantly improved journey times between London, Birmingham, Manchester Piccadilly, the Midlands and south of the UK;
 - the creation of a new multi-modal transport hub serving the wider area and linking to Manchester Airport, providing taxi facilities, bus drop off and pick up and provision for servicing and loading; and
 - released capacity on the existing rail network easing pressure and reducing crowding on other passenger rail services creating significant major beneficial effects to both local commuters and potentially freeing up space for freight.
- 14.5.8 The permanent realignment of roads could increase travel distances for bus passengers. However, as most of the realignments are likely to be less than 1km in length, it is not currently expected that there would be significant effects on public transport within the Hulseheath to Manchester Airport area.
- 14.5.9 Operational effects arising from the Proposed Scheme in year 2033 and year 2046 for the Hulseheath to Manchester Airport area will be reported in the formal ES.

Highway network

Strategic and local highway network

- 14.5.10 The Proposed Scheme would result in a number of permanent highway changes. These include:
- M56 junction 6, includes improvements of M56 junction 6 layout with A538 to accommodate HS2 station access;
 - Ashley Road closure and diversion via new Lamb Lane/Mobberley Road;

- Brickhill Lane new link connecting to realigned Castle Mill Lane/Mill Lane;
- Castle Mill Lane realignment;
- Hasty Lane closure;
- Lamb Lane new link connecting to Mobberley Road;
- Mill Lane realignment and link to Brickhill Lane;
- Millington Lane realignment;
- Mobberley Road realignment;
- Sunbank Lane realignment; and
- Thorley Lane realignment.

14.5.11 Operation of the Proposed Scheme would result in changes in traffic flows due to passengers and staff accessing the Manchester Airport High Speed station. Together with the impact of changes to the highway network this could result in changes to traffic movements in the Hulseheath to Manchester Airport area and affect, in particular, the M56 junction 6 and the A538 Hale Road.

14.5.12 The effects of these changes will be reported in the formal ES.

Accidents and safety

14.5.13 Changes in traffic could result in changes in accident risk. Operational effects arising from the Proposed Scheme will be reported in the formal ES.

Parking and loading

14.5.14 It is currently expected that there would be a permanent loss of car parking at locations along the route of the Proposed Scheme in this area. This would include Manchester Airport Marriot Hotel and Halebarns House Where car parking is lost that would have served facilities that are displaced by the Proposed Scheme this is not considered a material effect.

Non-motorised users

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

- Ashley Footpath 3/1, north-west of Birkin Farm, to be diverted;
- Ashley Footpath 7/1 route to be closed and diverted;
- Ashley Footpath 6/5 route to be closed and diverted;
- Agden Footpath 1/2, north-west of Arthill Heath Farm, to be diverted,
- Agden Footpath 2/4, north-west of Arthill Heath Farm, to be diverted;
- Hale Road Footpath 16, off Brooks Drive, to be closed;

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- Millington Footpath 3/1, north-west of Millington Hall, to be diverted;
- Millington Footpath 4/1, north-west of Millington Hall, to be closed;
- Millington Footpath 5/2, north-west of Millington Hall, to be closed;
- Millington Footpath 8/1, north of Newhall Cottages; to be closed;
- Millington Footpath 7/2, off Coe Lane; to be diverted,
- Ringway Footpath 12, off Chapel Lane/Sunbank Lane, to be diverted;
- Ringway Footpath 11, south-west of Keepers Cottage, to be diverted;
- Rostherne Footpath 13/1, north of Covert Cottage, to be closed;
- Rostherne Footpath 4/1, north of Covert Cottage, to be closed;
- Ringway Footpath 9, south A538 Hale Road/M56 junction 6, to be closed
- Ringway Footpath 8, off A538 Wilmslow Road/M56 junction 6, to be closed; and
- Ringway Footpath 7 leading from Hasty Lane under M56, to be closed.

14.5.16 The realignment of some of the PRoW would increase journey distance and time for non-motorised users and may result in significant effects. 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 Ashley Footpath 3/1, Millington Footpath 7/2 and Millington Footpath 3/1. The assessment of these changes will be reported in the formal ES.

14.5.17 It is expected that Manchester Airport High Speed station would generate additional pedestrian movements in the morning and evening peak hour. These pedestrian movements would then be dispersed to access onward travel modes and nearby destinations, increasing use of footways and crossings in the local area. The effect of these changes will be reported in the formal ES.

Other mitigation measures

14.5.18 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.

14.5.19 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

14.5.20 Operation of Proposed Scheme is expected to provide major beneficial impacts by providing improved journey times and additional capacity between major cities in the North, the Midlands and the South of the UK and the new Manchester Airport High Speed station. The use of released capacity on the

conventional rail network will result in benefits to users of conventional rail services.

- 14.5.21 Operation of the Proposed Scheme would require the permanent diversion of: the M56 junction 6, Ashley Road, Brickhill Lane, Castle Mill Lane, Lamb Lane, Mill Lane, Millington Lane, Mobberley Road, Sunbank Lane, Hasty Lane and Thorley Lane. Additional rail users of the HS2 Manchester Airport Station will also result in increased traffic in the wider road network. Increases in traffic could also result in increased traffic severance for non-motorised users of the routes.
- 14.5.22 Operation of the Proposed Scheme is expected to permanently divert or close the following PRoW: Ashley Footpath 3/1; Ashley Footpath 7/1; Ashley Footpath 6/5; Agden Footpath 1/2; Agden Footpath 2/4; Hale Road Footpath 16; Millington Footpath 3/1; Millington Footpath 4/1; Millington Footpath 5/2; Millington Footpath 8/1; Millington Footpath 7/2; Ringway Footpath 12; Ringway Footpath 11; Rostherne Footpath 13/1; Rostherne Footpath 4/1; Ringway Footpath 9; Ringway Footpath 8; and Ringway Footpath 7.
- 14.5.23 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

- 14.5.24 Volume 1, Section 9 sets out the general approach to environmental monitoring during operation of the Proposed Scheme.
- 14.5.25 A station travel plan would detail monitoring of travel associated with operation of the Manchester Airport High Speed station.
- 14.5.26 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 Hulseheath to Manchester Airport 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, and Lead Local Flood Authorities (LLFA): Cheshire East Council (CEC), Trafford Metropolitan Borough Council (TMBC) and Manchester City Council (MCC). Engagement has also been undertaken with 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: MAo6 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)¹⁴⁸.

¹⁴⁸ National Planning Policy Framework, DCLG, 2015

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)¹⁴⁹.
- 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 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 Timperley Brook.
- 15.2.6 Groundwater levels have been inferred from the available Environment Agency groundwater level monitoring boreholes, historic borehole logs and topographic data, as well as from spring and watercourse locations.
- 15.2.7 Impacts on biological receptors such as aquatic fauna and flora are assessed in Section 7, Ecology and biodiversity.
- 15.2.8 The assessments in this working draft ES are based on professional judgement using the information that is currently available. A precautionary approach has been adopted with 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 Upper management catchment of the North West river basin district (RBD).

¹⁴⁹ Supporting document: HS2 Phase 2b Environmental Impact Assessment Scope and Methodology Report

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- 15.3.2 The river basin management plan¹⁵⁰ identifies the chemical¹⁵¹ and ecological¹⁵² status of surface water bodies, and the quantitative¹⁵³ and chemical¹⁵⁴ status of groundwater bodies within this RBD.
- 15.3.3 To be compliant with WFD legislation, the Proposed Scheme should not cause deterioration of a water body from its current status; nor prevent future attainment of good status where this has not already been achieved. The Proposed Scheme should also avoid adverse impacts on protected or priority species and habitats.
- 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 28. The receptor value attributed to each individual water body is based on the methodologies set out in the SMR.

Table 28: Surface water body receptors

Water body name and location ¹⁵⁵	Designation	Q95 value (m ³ /s) ¹⁵⁶	Receptor value	Parent WFD water body name and identification number ¹⁵⁷	Current WFD status/Objective ¹⁵⁸
Millington Clough ¹⁵⁹ WR-01-308b B6	Main river	0.004	Moderate	Bollin (Ashley Mill to Manchester Ship Canal) GB112069061382	Moderate/Moderate by 2015
Agden Brook ¹⁵⁹ WR-01-308b B5/B6	Main river	0.006	Moderate		
Blackburn's Brook WR-01-308b E5	Main river	0.02	High	Birkin Brook - Mobberley Brook to River Bollin	Bad/Moderate by 2027

¹⁵⁰ Environment Agency (2015), *Water for life and livelihoods Part 1: North West river basin district: River basin management plan*

¹⁵¹ The chemical status of surface waters reflects concentrations of priority and hazardous substances present

¹⁵² The ecological status of surface waters is determined based on the following elements:

- Biological elements – communities of plants and animals (for example, fish and rooted plants), assessed in the ecology and biodiversity section;
- Physico-chemical elements – reflects concentrations of pollutants such as metal or organic compounds, such as copper or zinc;
- Hydromorphological elements – reflects water flow, sediment composition and movement, continuity (in rivers) and the structure of physical habitats.

¹⁵³ 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

¹⁵⁴ 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

¹⁵⁵ The feature locations are indicated by the grid coordinates on the relevant Volume 2: MAo6 Map Book figure (in this case WR-01)

¹⁵⁶ This is the flow within the watercourse that is exceeded for 95% of the time

¹⁵⁷ The Environment Agency has attributed each surface water and groundwater body a unique water body identification (ID) number.

¹⁵⁸ Status and objectives are based on those set out in the 2015 River basin management plan

¹⁵⁹ Upstream sections and tributaries of Millington Clough and Agden Brook form part of the boundary with community area MA03 Pickmere to Agden and Hulseheath and are assessed in that report

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Birkin Brook WR-01-308b F5	Main river	0.1	High	(including Rostherne Brook) GB112069061370	
Tributary of Birkin Brook 1 WR-01-308b G7	Main river	<0.002	Moderate		
Tributary of Birkin Brook 3 WR-01-308b G6	Ordinary watercourse	<0.002	Low		
Rostherne Brook WR-01-308b D7	Main river	0.02	High		
Tributary of River Bollin 2 WR-01-309a B7	Ordinary watercourse	<0.002	Moderate	Bollin (River Dean to Ashley Mill) GB112069061381	Moderate/Moderate by 2015
River Bollin WR-01-309a B7	Main river	0.3	High		
Tributary of River Bollin 3 WR-01-309a B7	Ordinary watercourse	<0.002	Moderate		
Cotteril Clough Brook WR-01-309a B8	Ordinary watercourse	0.003	Moderate		
Tributary of Timperley Brook 1 WR-01-309a D6	Ordinary watercourse	<0.002	Low	Timperley Brook GB112069061260	Moderate/Good by 2027
Timperley Brook WR-01-309a D6	Main river	0.003	Moderate		Moderate/Good by 2027
Rostherne Mere WR-01-308b D5/D6	Lake	n/a	Very high	Rostherne Mere GB31232650	Bad/Good by 2027

Abstractions and permitted discharges (surface water)

- 15.3.6 There is one licensed surface water abstraction in the study area¹⁶⁰. This abstraction is not located within the land required for the construction and operation of the Proposed Scheme. This is considered to be a high value receptor.
- 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

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.

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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 34 consented discharges to surface waters within the study area¹³, 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 29. Unless stated otherwise, the geological groups listed would all be crossed by the Proposed Scheme. Table 29 also identifies the receptor values attributed to each groundwater receptor based on the methodologies set out in the SMR.

Table 29: 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
Alluvium	Along valleys of Agden Brook, Birkin Brook, Mobberley Brook, River Bollin	Clay, silt, sand and gravel	Secondary A	Weaver and Dane Quaternary sand and gravel aquifers (GB41202G99 1700)	Good by 2027	Moderate
Shirdley Hill Sand Formation	Isolated outcrops across the study area	Sand	Secondary A	Poor		Moderate
Glaciofluvial heet deposits	Along Agden Brook, The Mere, Blackburn's Brook, Birkin Brook and the River Bollin	Sand and gravel	Secondary A			Moderate
Glacial till	Extensive cover across the study area, primarily on higher ground	Sandy silty clay	Secondary (undifferentiated)			Moderate

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

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Bedrock						
Mercia Mudstone Group - Tarporley Siltstone Formation	Would be crossed by the route of the Proposed Scheme	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	Would be crossed by the route of the Proposed Scheme in the valley of Agden Brook	Pebbly sandstone	Principal	Lower Mersey Basin and Merseyside North Permo-Triassic Sandstone Aquifers (GB41201G101700) Poor status	Good by 2027	High
Mercia Mudstone Group - Sidmouth Mudstone Formation - Bollin Mudstone Member	Outcrops across the majority of the study area	Mudstone and siltstone with some halite bearing units, and presence of gypsum.	Secondary B	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Moderate
Mercia Mudstone Group – Sidmouth Mudstone Formation – Northwich Halite Member	Outcrops south of M56 junction 8 and south-east of Higherhouse Farm, Thorns Green	Halite-stone and mudstone	Unproductive	Not assessed by the Environment Agency	Not assessed by the Environment Agency	Low

Superficial deposit aquifers

15.3.10 The basis of the receptor values attributed to the superficial deposit aquifers present within the study area, as shown in Table 29, is outlined briefly as alluvium, river terrace deposits, glacial till and glaciofluvial sheet deposits, 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 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 29 is outlined briefly as follows:

- the Sherwood Sandstone Group (locally comprising sandstone of the Helsby Sandstone Formation and the Chester Formation) has been classified as a Principal aquifer by the Environment Agency. This aquifer

can also provide an important component of baseflow to rivers. It has, therefore, been assessed as a high value receptor;

- the Mercia Mudstone Group, which includes the Bollin Mudstone Member of 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 from the Bollin Mudstone Member of the Sidmouth Mudstone Formation and the Tarporley Siltstone Formation, which have, therefore, been classified as moderate value receptors; 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 29. 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 within the study area. There are no SPZs associated with licensed public water supplies within 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. Information obtained from the local authorities indicates that there is one unlicensed private groundwater abstraction registered within the study area at Lower House Lane, as shown on Map WR-02-201. The nature and source of this abstraction has not yet been confirmed. It is assumed to be groundwater from the Tarporley Siltstone Formation aquifer and on a precautionary basis is assumed to be used for potable supply. The abstraction is therefore assumed to be a high value receptor. 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 are no consented discharges to groundwater in the study area.

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 47 features within

the study area that had potential to be springs. Two of these features have been inspected and they were verified as being minor land drainage features of low value.

- 15.3.18 The remaining 45 potential spring features that have yet to be inspected are assumed to be high value receptors on a precautionary basis. Four of these potential spring features are within the land required for the Proposed Scheme. They are at Ecclesfield Wood, at Lamb Lane west of Stock Farm, north of Mereside Farm Chester Road, and at the hotel on Hasty Lane.
- 15.3.19 There are 37 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 The following nature conservation sites within the study area are potentially groundwater dependent:
- Rostherne Mere Ramsar site, site of special scientific interest (SSSI) and National Nature Reserve (NNR) is predominantly supported by surface water inflows. Some of the inflows originate as discharges to the Rostherne Brook and tributary streams from springs in the catchment area to the south of Rostherne Mere. Rostherne Mere is also supported by groundwater discharging from springs in superficial deposits, comprising glacial till, glaciofluvial deposits and alluvium, located within the SSSI;
 - Cotteril Clough SSSI is potentially dependent on the Cotteril Clough Brook which may be fed by springs from the glacial till. Both Cotteril Clough Brook and Cotteril Clough SSSI are, therefore, considered to be potentially groundwater and surface water dependent;
 - The Midland Meres and Mosses Phase 1 Ramsar site comprises 16 geographically discrete areas across the Cheshire Plain. One component SSSI considered in Section 7, Ecology and biodiversity, is The Mere, Mere which is located in Pickmere to Agden and Hulseheath (MA03). As such The Mere, Mere will be considered in the Volume 2: Community area report MA03 Pickmere to Agden and Hulseheath;
 - Sunbank Wood Ancient Woodlands Inventory Site (AWIS) and site of biological importance (SBI) includes streams that rise from springs (from the glacial till) to the north and east of the site, and is considered to potentially be both groundwater and surface water dependent;
 - Rushy-Pits Covert SBI may be dependent on groundwater from the glacial till;

- Hancock's Bank South Ancient Woodland, SBI and local wildlife site (LWS) is located along the banks of Blackburn's Brook, but may also be dependent on groundwater in the underlying alluvium; and
- Davenport Green Wood Ancient Woodland and SBI is located on both banks of the Timperley Brook, but may also be dependent on groundwater in the underlying glacial till.

- 15.3.21 No designated sites within the study area, which are dependent solely on surface water flows, have the potential to be affected by the Proposed Scheme.
- 15.3.22 Further details of the ecology of these sites, including the reporting on the effects and associated other mitigation, are provided in Section 7, Ecology and biodiversity.

Existing baseline - flood risk and land drainage

- 15.3.23 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).
- 15.3.24 The updated Flood map for surface water¹⁶⁵ 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 dataset¹⁶⁶. The British Geological Survey's (BGS) Groundwater flooding susceptibility data set¹⁶⁷, has been used to assess the future risk of groundwater flooding.
- 15.3.25 The following reports were used to help determine the baseline flood risk within the study area:
- Cheshire East Preliminary Flood Risk Assessment (PFRA) (2011)¹⁶⁸;
 - Trafford Council PFRA (2011)¹⁶⁹;
 - Cheshire East Strategic Flood Risk Assessment (SFRA) (2013)¹⁷⁰;
 - Manchester City, Salford City and Trafford Councils Hybrid SFRA (2010)¹⁷¹;

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 Jacobs (2011) *Cheshire East Preliminary Flood Risk Assessment*

¹⁶⁹ JBA Consulting (2011), *Trafford Council Preliminary Flood Risk Assessment*

¹⁷⁰ JBA Consulting (2013), *Cheshire East Council Strategic Flood Risk Assessment*

¹⁷¹ JBA Consulting (2010), *Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA*

- Cheshire East Local Flood Risk Management Strategy (LFRMS) (2017)¹⁷²; and
- Trafford LFRMS (2014)¹⁷³.

River flooding

15.3.26 The study area includes substantial areas of floodplain (Flood Zone 2 or 3) associated with Birkin Brook and the River Bollin. Other floodplains that would be crossed by the route of the Proposed Scheme include those associated with Agden Brook, Blackburn's Brook and Timperley Brook. Table 30 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 30: River flood risk sources and receptors

Source	Location description and figure/coordinate ¹⁷⁴	Receptor potentially affected	Receptor value/sensitivity to flooding
Birkin Brook	Birkin Brook WR-01-308b F5	M56 (junction 7)	Very high
River Bollin	River Bollin WR-01-309a B7	Residential property	High
		Mill Lane	Moderate
Timperley Brook	Timperley Brook WR-01-309a D6	Manchester Airport	Very high

Surface water flooding

15.3.27 There are three 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 31. The value of these receptors, based on Table 57 of the SMR, is also indicated.

Table 31: Surface water flood risk sources and receptors

Source ¹⁷⁵	Location description and figure/coordinate ¹⁷⁶	Receptor potentially affected	Receptor value
Agden Brook	Millington Hall WR-01-308b B5	Residential property	High
Surface water flow path south of Yarwoodheath Covert	Tom Lane WR-01-308b B5	Tom Lane	Moderate

¹⁷² Cheshire East Council (2017), *Cheshire East Council Local Flood Risk Management Strategy (LFRMS)*

¹⁷³ Trafford Council (2014), *Trafford Local Flood Risk Management Strategy (LFRMS)*

¹⁷⁴ This is the location at which the source intersects the Proposed Scheme, as indicated by the grid coordinates on the relevant Volume 2: MAo6 Map Book figure (in this case WR-01)

¹⁷⁵ Potential receptors associated with Millington Clough are reported in Volume 2: Community area report MAo3 Pickmere to Agden and Hulseheath

¹⁷⁶ This is the location at which the source intersects the Proposed Scheme, as indicated by the grid coordinates on the relevant Volume 2: MAo6 Map Book figure (in this case WR-01)

Surface water flow path south of Ashley	South of Ashley WR-01-308b G7	Mobberley Road	Moderate
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Artificial water bodies

- 15.3.28 Flooding from artificial water bodies may occur due to failure of an impounding structure, such as a dam or canal embankment. Artificial water bodies, or artificially raised water bodies, with potential implications for flood risk within the study area include Tatton Park Mere and Melchett Mere. Other artificial water bodies, or artificially raised water bodies, outside of the study area but with potential to affect flood risks of relevance to the Proposed Scheme are Radnor Mere, Ridgeway Reservoir, Trentabank Reservoir and Lamaload Reservoir. However, as they are large raised reservoirs or impounded water bodies¹⁷⁷, subject to the requirements of reservoir safety legislation¹⁷⁸, the inundation risk posed by them is considered negligible.

Groundwater flooding

- 15.3.29 Information related to historical incidents of groundwater flooding in the Hulseheath to Manchester Airport area is included in the CEC SFRA¹⁷⁰ and LFRMS¹⁷², as well as in the Manchester City, Salford City and Trafford Councils Hybrid SFRA¹⁷¹ and LFRMS¹⁷³. These documents state that there is no history of groundwater flooding within the area.
- 15.3.30 The BGS Groundwater flooding susceptibility data set indicates that there is some potential for groundwater flooding to occur in the floodplains of Birkin Brook and the River Bollin, as well as near Millington, Ashley, and in the area close to Hale Barns, due to the nature of the superficial deposits (glacial till).

Land drainage

- 15.3.31 Existing topography, soils and land drainage systems within the study area are described in Section 4, Agriculture, forestry and soils. The rivers and watercourses within the area are connected to an extensive network of existing open drains. Subsurface drainage systems are also likely to be present in fields used for agriculture. The land drainage function of these systems, which is important for crop productivity, is potentially sensitive to increases in water levels within the receiving watercourses.

15.4 Effects arising during construction

Avoidance and mitigation measures

- 15.4.1 The principal strategy adopted to limit the temporary and permanent effects of the Proposed Scheme is through avoidance of sensitive receptors wherever reasonably practicable. Where receptors could not be avoided, mitigation measures have been incorporated where appropriate and reasonably practicable, to limit the potential effects. Section 16 of the draft Code of

¹⁷⁷ Meres listed have been analysed for dam breach by the Environment Agency and are included in the Reservoir Flood Maps dataset

¹⁷⁸ <https://www.gov.uk/guidance/reservoirs-owner-and-operator-requirements>

Construction Practice (CoCP)¹⁷⁹ 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 Agden Brook, Blackburn’s Brook, Birkin Brook and the River Bollin 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.
- 15.4.4 The temporary works shown on Map Series CT-05 in the Volume 2: MAo6 Map Book have been informed by a detailed consideration of the water resources constraints and have sought to avoid sensitive features wherever reasonably practicable.
- 15.4.5 Watercourse realignments are proposed at the following locations: Tributary of Birkin Brook 1 (due to highway realignment), Tributary of Birkin Brook 3, and Timperley Brook (due to inverted siphon). 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 condition¹⁸⁰.

¹⁷⁹ Supporting document: Draft Code of Construction Practice

¹⁸⁰ ‘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

- 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
 - 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 are those on Millington Clough for access road, and Tributaries 1 and 3 of Birkin Brook at Mobberley Road realignment. There is also a culvert extension and inverted siphon proposed at Timperley Brook. There may be localised watercourse 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, with the exception of one inverted siphon on Timperley Brook immediately downstream of Manchester Airport;
- 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.

15.4.15 The types of measure likely to be adopted could include:

- installation of cut-off¹⁸¹ structures around excavations;
- ensuring cut-off structures are driven to sufficient depths to meet an underlying strata or zone of lower permeability;
- promoting groundwater recharge, such as discharging pumped water to recharge trenches around excavations to maintain baseline groundwater and surface water conditions; and
- incorporating passive bypasses within the design, which could comprise a 'blanket' of permeable material, such as gravel, placed around temporary structures allowing groundwater to bypass the below-ground works, without a rise in groundwater levels on the upstream side.

¹⁸¹ Impermeable barrier preventing water flow

15.4.16 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

15.4.17 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 highway realignments of Lamb Lane and Mobberley Road, which would intersect the floodplains of Tributaries 1 and 3 of Birkin 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: MAo6 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 Agency¹⁸²;
- 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;
- 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

¹⁸² Environment Agency (2016) Adapting to Climate Change. Advice for Flood and Coastal Erosion Risk Management Authorities

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.

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

- preparation of flood risk assessments and method statements for temporary works, including main construction and satellite compound drainage, watercourse crossings and realignments and temporary realignments in consultation with the Environment Agency, and where applicable, the LLFA and other relevant regulators;
- location of storage, machinery, equipment and temporary buildings outside flood risk areas where reasonably practicable;
- construction of outfalls during periods of low flow to reduce the risk of scour and erosion;
- design of temporary watercourse realignments with equivalent hydraulic capacity to the existing channels, ensuring that field subsurface drainage systems can be adapted to discharge into the new channel; and
- having regard to the requirement for construction activities to avoid any increases in flood risk to vulnerable receptors.

15.4.19 In accordance with Section 16 of the draft CoCP, monitoring will also be undertaken in consultation with the Environment Agency and, where applicable, the LLFA, to ensure that temporary structures are installed, maintained and removed in accordance with the relevant environmental approvals and that impact on existing land drainage systems are managed appropriately.

Assessment of impacts and effects

15.4.20 This section describes the significant effects following the implementation of the avoidance and mitigation measures. The majority of the potential temporary impacts on the water environment during construction will be avoided or mitigated by the working methods outlined in the draft CoCP.

The mitigation embedded into the design has focused on reducing permanent impacts resulting from the presence of the Proposed Scheme to as low a level as is reasonably practicable.

Temporary effects – Water resources and WFD

Surface water

- 15.4.21 Potential temporary impacts on surface water quality, due to site runoff and increased pollution risk, are a key concern during construction and have the potential to affect abstractions and the water environment more generally. However, the practices outlined in the draft CoCP are considered adequate to mitigate any impacts, such that there are unlikely to be any significant effects.
- 15.4.22 Potential temporary impacts on baseflow in surface water receptors arising from dewatering effects are described in 'Groundwater – surface water interactions' below.

Groundwater

Aquifers

- 15.4.23 The proposed Rostherne cutting, Halebank cutting, M56 East box structure, Manchester Airport High Speed Station cutting, Manchester Airport High Speed station and Manchester Tunnel South portal would intersect the Sherwood Sandstone Group Principal aquifer, the Mercia Mudstone Group Secondary B aquifer and the glacial till Secondary (undifferentiated) aquifer. Whilst there are likely to be minor localised impacts, the implementation of the measures outlined in the draft CoCP is likely to mean that any effects on the overall status of these aquifers would not be significant.
- 15.4.24 Where cuttings could affect local receptors, such as groundwater abstractions or springs, this is reported in the sections below.

Abstractions

- 15.4.25 No licensed groundwater abstractions have been identified in the study area. The assessment has not identified any temporary significant effects on unlicensed groundwater abstractions.

Groundwater - surface water interactions

- 15.4.26 During the construction of Halebank cutting, M56 East box structure and Manchester Airport High Speed Station cutting, dewatering of the surrounding strata may be required. This could result in a temporary reduction in flow to four potential springs which, pending site survey and on a precautionary basis, are assumed to be high value receptors. The potential spring features are listed below, with the impact and resultant effect provided in brackets for each feature:
- spring at Sunbank Wood, 400m east of Halebank Farm (minor impact, moderate adverse effect, significant);

- spring at Oak Farm Cottages, Sunbank Lane (minor impact, moderate adverse effect, significant);
- spring 127m south-east of Keepers Cottage, Sunbank (moderate impact, moderate adverse effect, significant); and
- spring at Keepers Cottage, Sunbank Lane (south) (moderate impact, moderate adverse effect, significant).

- 15.4.27 During the construction of Halebank cutting, dewatering would be required. This would result in a temporary reduction in groundwater levels which may, in turn, reduce the baseflow to two unnamed tributaries of the River Bollin in the Halebank area, one between Halebank Farm and the M56 (Tributary of River Bollin 3), and the other south-east of Sunbank Lane (Tributary of River Bollin 2) in Sunbank Wood. For these moderate value receptors, this would be a moderate impact, resulting in moderate adverse effects which are significant.
- 15.4.28 During the construction of Halebank cutting, M56 East box structure and Manchester Airport High Speed Station cutting, dewatering would be required. This would result in a moderate reduction in groundwater levels which may, in turn, reduce the baseflow to Timperley Brook (moderate value receptor) and its tributary (low value receptor). The moderate impact on the Timperley Brook would result in a moderate adverse effect, which would be significant, and on the tributary of the Timperley Brook, a minor adverse effect, which is not significant.
- 15.4.29 During the construction of Manchester Airport High Speed station and Manchester Tunnel South portal, dewatering of the surrounding strata may be required. This could result in a moderate reduction in flow to the spring at Davenport Green, Roaring Gate Lane which, pending site survey, is assumed to be a high value receptor. This is assessed to be a moderate impact, resulting in a moderate adverse effect, which is significant.

Water dependent habitats

- 15.4.30 The construction of the Halebank cutting, the M56 East box structure and Manchester Airport High Speed Station cutting are likely to require some dewatering, temporarily lowering groundwater levels locally and potentially causing groundwater flow to converge on the cutting. This could result in the reduction of baseflow to watercourses within Sunbank Wood AWIS and SBI. This would have a temporary minor impact.
- 15.4.31 The construction of the Manchester Airport High Speed Station cutting is likely to require some dewatering, temporarily lowering groundwater levels locally and potentially causing groundwater flow to converge on the cutting. This could result in a reduction in groundwater levels beneath the Davenport Green Wood SBI and Ancient Woodland. This would have a temporary moderate impact.
- 15.4.32 The effects related to these impacts are reported in Section 7, Ecology and biodiversity.

Temporary effects - Flood risk and land drainage

- 15.4.33 Construction of the Agden Brook viaduct, Blackburn's Brook viaduct and the River Bollin East viaduct would require temporary working within flood zones. Construction sequencing and temporary works design will be carefully considered and assessed in terms of potential impacts on flood risk. Method statements detailing how these works will be undertaken will be produced by the nominated undertaker in consultation with the Environment Agency and the LLFA. It is not anticipated that these temporary activities would result in significant effects related to flood risk and land drainage.

Permanent effects – Water resources and WFD

- 15.4.34 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

- 15.4.35 The culvert and associated realignment of Tributary of Birkin Brook 1 could be up to 100m long, which has the potential to cause a moderate impact on the hydromorphology of this moderate value receptor. This would potentially result in a moderate adverse effect, which is significant.
- 15.4.36 The culvert and inverted siphon proposed on the headwaters of Timperley Brook has the potential to cause a moderate impact on the hydromorphology of this moderate value receptor. This would potentially result in a moderate adverse effect, which is significant.

Groundwater

Aquifers

- 15.4.37 The proposed cuttings in the study area would intersect the Sherwood Sandstone Group Principal aquifer, the Mercia Mudstone Group Secondary B aquifer and the glacial till Secondary (undifferentiated) aquifer. Whilst there are likely to be permanent minor localised impacts, the implementation of the avoidance and mitigation measures would mean that any effects on the overall status of these aquifers would not be significant.

Abstractions

- 15.4.38 No licensed groundwater abstractions have been identified in the study area. The assessment has not identified any permanent significant effects on unlicensed groundwater abstractions.

Groundwater - surface water interactions

- 15.4.39 The Proposed Scheme would result in the permanent loss of two potential spring features: spring at Lamb Lane, west of Stock Farm, and spring at the hotel on Hasty Lane. These features are assumed to be high value receptors on a precautionary basis (pending site survey) and their loss is considered a major impact resulting in a permanent major adverse effect, which is significant.

- 15.4.40 Groundwater discharge which may occur in the Rostherne cutting and Thorns Green cutting, as well as any temporary dewatering during construction of these cuttings, could result in a permanent reduction in groundwater levels locally. The local lowering of groundwater levels could result in a reduction in flow to two potential spring features, spring 310m north of Mereside Farm, Chester Road, Millington; and spring 220m west of Pigleystair Bridge, River Bollin. Pending site survey, these features are considered to be high value receptors. Therefore, on a precautionary basis the assessment indicates major impacts on these springs which results in major adverse effects, which are significant.
- 15.4.41 Construction of the Halebank cutting, M56 East box structure and Manchester Airport High Speed Station cutting would form a barrier to groundwater flow, which along with any construction dewatering would locally effect groundwater levels. This could result in a reduction in flow to two potential springs which, pending site survey, are assumed to be high value receptors. The potential spring features are listed below, with the impact and resultant effect provided in brackets for each feature:
- spring 120m east of Keepers Cottage, Sunbank Lane (moderate impact, resulting in moderate adverse effect, which is significant); and
 - spring at Keepers Cottage, Sunbank Lane (north) (moderate impact, resulting in moderate adverse effect, which is significant).

Water dependent habitats

- 15.4.42 Groundwater discharge which may occur in the Rostherne cutting, as well as any temporary dewatering during construction of the cutting, could result in the lowering of groundwater levels locally. This would not cause any direct loss of water from Rostherne Mere as the water level in the mere is about 21m AOD, well below the elevation of the deepest part of the cutting (27m AOD). However, the presence of the cutting, and any temporary dewatering, could potentially reduce flow through the mere by intercepting groundwater that would otherwise discharge to the mere.
- 15.4.43 Groundwater intercepted by the land drainage systems in the cutting, and any temporary dewatering discharge during construction, would be returned to tributary streams or other drainage features that discharge to the mere. This would ensure that the total volume of water flowing through the mere would be comparable to its natural state. There may, however, be changes to the timing of some flow to the mere compared to the baseline situation. This might result in a reduction of flow through the mere during dry periods.
- 15.4.44 A site reconnaissance visit was undertaken in May 2018 to provide a preliminary assessment of the relative contributions to the mere from various watercourses and springs. A few small springs were found to be present in the north of the mere catchment where the Rostherne cutting would be located. Approximate estimates of flows were made during the visit. The results suggest that the total discharge from these northern springs was less than 1% of the total observed

inflow to the mere, and possibly less than 0.1% of this total inflow. It is unlikely, therefore, that a change in the timing of discharges from the area of the cutting would have an impact on Rostherne Mere during dry periods.

- 15.4.45 Further investigation of flows will be carried out to better understand the potential impacts of changes to spring discharge in the north of the mere catchment where Rostherne cutting would be located, and the potential subsequent impact on water levels in the mere. However, on a precautionary basis, a permanent minor impact is assumed at this stage.
- 15.4.46 Groundwater discharge into the Rostherne cutting, and any dewatering required for construction, is also likely to reduce groundwater levels in the glacial till Secondary (undifferentiated) aquifer which underlies the Rushy-Pits Covert SBI, Hancock Bank Ancient Woodland and Hancock's Bank South LWS. These are considered to have a permanent minor impact.
- 15.4.47 The effects related to the above impacts are reported in Section 7, Ecology and biodiversity.

Permanent effects - Flood risk and land drainage

- 15.4.48 Hydraulic modelling of Timperley Brook is currently being undertaken to assess potential permanent effects related to flood risk. On a precautionary basis it is currently anticipated that the Proposed Scheme would result in major impacts on flood levels. This would potentially impact on Manchester Airport, which is a very high value receptor, resulting in a major adverse effect, which is significant.

Other mitigation measures

- 15.4.49 Additional mitigation measures to further reduce the temporary and permanent impacts of construction stage activities, where there is potential for the Proposed Scheme to result in significant effects are described in the sections below.

Surface water

- 15.4.50 The embedded mitigation proposed in the design of the culvert at Millington Clough, Tributary of Birkin Brook 1 and Tributary of Birkin Brook 3 and the proposed siphon at Timperley Brook will be developed further in consultation with the Environment Agency. Offsite mitigation may be required for Timperley Brook and could take the form of downstream de-culverting or river restoration.

Groundwater

- 15.4.51 A survey of the potential spring features that could be affected by the Proposed Scheme will be undertaken to determine their value and to identify whether further mitigation is required. If surveys confirm the features are high or moderate value springs, measures will be implemented to ensure any adverse impacts are mitigated, as far as reasonably practicable.

Groundwater - surface water interactions

- 15.4.52 Additional mitigation measures may be required for the management of groundwater baseflows to the nearby surface watercourses and springs during

excavation and dewatering of Halebank cutting, the M56 East box structure, Manchester Airport High Speed Station cutting, Manchester Airport High Speed station and Manchester Tunnel South portal. Mitigation measures will be designed in detail following ground investigation and monitoring of surface water and groundwater levels. Mitigation could take the form of:

- adoption of construction techniques that avoid the need for dewatering;
- discharge of abstracted water to ground; and
- recirculation of treated water to the affected receptors.

15.4.53 Following completion, Halebank cutting, M56 East box structure, Manchester Airport High Speed Station cutting and Manchester Tunnel South portal may form a barrier to groundwater movement, reducing flow to two nearby springs. If site surveys show these to be high or moderate value receptors, mitigation measures will be designed in detail following ground investigation and monitoring of surface water and groundwater levels. Mitigation could take the form of:

- installation of a compartmentalised groundwater drainage layer to allow groundwater to pass unimpeded across the cutting; and
- recirculation of water to the affected receptors after appropriate treatment.

15.4.54 Any such additional measures will be designed in consultation with the Environment Agency.

Flood risk and land drainage

15.4.55 Hydraulic modelling is currently being undertaken for the proposed Manchester Airport station and its interaction with Timperley Brook. Any requirement for mitigation identified from the analysis will be developed in consultation with the Environment Agency.

Summary of likely residual significant effects

15.4.56 In the absence of the other mitigation measures set out above, the Proposed Scheme would potentially result in residual significant effects as follows:

- construction of a culvert up to 100m long on Tributary of Birkin Brook 1 resulting in a permanent moderate adverse effect on the water body hydromorphology, which is significant;
- construction of an inverted siphon on Timperley Brook water body resulting in a permanent moderate adverse effect on the water body hydromorphology, which is significant;
- construction and presence of the Rostherne cutting to have a:
 - permanent major impact on assumed high value spring 310m north of Mereside Farm, Chester Road, Millington resulting in a major adverse effect, which is significant;

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- permanent minor impact on an assumed high value spring 100m west of Bowdon View, Coe Lane resulting in a moderate adverse effect, which is significant; and
- permanent loss of one assumed high value spring feature at Lamb Lane, west of Stock Farm. This major impact results in a permanent major adverse effect, which is significant.
- permanent minor impact on the timing of groundwater flow to Rostherne Mere, assumed on a precautionary basis. The effects related to this impact are reported in Section 7, Ecology and biodiversity;
- permanent minor impact on groundwater levels at Hancocks Bank Ancient Woodland and Hancock's Bank South LWS. The effects related to this impact are reported in Section 7, Ecology and biodiversity;
- construction of Halebank cutting, the M56 East box structure and Manchester Airport High Speed Station cutting to have a:
 - minor or moderate temporary impact on four potential springs (which pending site survey are assumed to be high value receptors), resulting in temporary moderate adverse effects, which are significant;
 - moderate temporary impact on baseflow to two unnamed tributaries of the River Bollin, which are assessed as moderate value receptors, resulting in temporary moderate adverse effects, which are significant;
 - temporary minor impact on Sunbank Wood ASNW and SBI (high value receptor). The effects related to this impact are reported in Section 7, Ecology and biodiversity;
 - temporary moderate impact on Davenport Green SBI and Ancient Woodland. The effects related to this impact are reported in Section 7, Ecology and biodiversity;
 - temporary impact on baseflow to Timperley Brook (moderate value receptor), resulting in a temporary moderate adverse effect, which would be significant; and
 - permanent moderate impact on flow to two assumed high value springs, resulting in a permanent moderate effect, which is significant.
- potential for construction of Manchester Airport High Speed station and Manchester Tunnel South portal to have a:
 - temporary moderate impact on the spring at Davenport Green, Roaring Gate Lane (which pending site survey is assumed to be a high value receptor), resulting in a temporary moderate adverse effect, which is significant;
 - permanent loss of one assumed high value spring features at the hotel on Hasty Lane. This major impact results in a permanent major adverse effect, which is significant; and

- potential for construction of Timperley Brook inverted siphon to have a major permanent adverse effect on flood risk at Manchester Airport, which is significant.

15.4.57 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 permanent loss of the spring feature at the hotel on Hasty Lane.

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.

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